

REPORT
OF THE
MINISTER OF AGRICULTURE
FOR THE
DOMINION OF CANADA
FOR THE
YEAR ENDING MARCH 31, 1922

PRINTED BY ORDER OF PARLIAMENT



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1922

CONTENTS

	PAGE
General Remarks	5
Supervision of Race Track Betting	7
Dominion Experimental Farms and Stations	8
Division of Animal Husbandry	9
Division of Field Husbandry	13
Division of Horticulture	14
Cereal Division	17
Division of Forage Plants	18
Division of Chemistry	20
Division of Botany	22
Poultry Division	23
Bee Division	24
Tobacco Division	25
Division of Economic Fibre Production	27
Division of Illustration Stations	28
Division of Extension and Publicity	30
Experimental Station, Charlottetown, P.E.I.	33
Experimental Station, Fredericton, N.B.	34
Experimental Farm, Nappan, N.S.	35
Experimental Station, Kentville, N.S.	36
Experimental Station, Ste. Anne de la Pocatière, P.Q.	37
Experimental Station, Lennoxville, Que.	40
Experimental Station, Cap Rouge, Que.	41
Experimental Station, Kapuskasing, Ont.	43
Experimental Station, La Ferme, Que.	44
Experimental Farm, Brandon, Man.	44
Experimental Station, Morden, Man.	46
Experimental Farm, Indian Head, Sask.	46
Experimental Station, Scott, Sask.	47
Experimental Station, Rosthern, Sask.	48
Experimental Station, Swift Current, Sask.	49
Experimental Station, Lethbridge, Alta.	49
Experimental Station, Lacombe, Alta.	51
Experimental Farm, Agassiz, B.C.	52
Experimental Station, Summerland, B.C.	53
Experimental Station, Invermere, B.C.	54
Experimental Station for Vancouver Island	55
Dairy and Cold Storage Branch	56
Health of Animals Branch	61
Pathological Division	64
Meat and Canned Foods Division	66
Live Stock Branch	70
Horse Division	70
Cattle Division	71
Poultry Division	76
Stock Yards Service and Markets Intelligence Division	85
Sheep and Swine Division	88
Seed Branch	103
Seed Division	105
Feed Division	106
Markets and Fertilizer Division	107
Entomological Branch	115
Division of Forest Insects	117
Division of Foreign Pests Suppression	117
Division of Field Crop and Garden Insects	118
Division of Systematic Entomology	118
Fruit Branch	122
Publications Branch	126
The Agricultural Instruction Act Branch	130
The International Institute Branch	134

APPENDIX No. I.

The International Seed Testing Congress, Copenhagen, Denmark, June 6-11, 1921	138
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REPORT
OF THE
MINISTER OF AGRICULTURE

1921-1922

*To General His Excellency the Right Honourable Lord Byng of Vimy, G.C.B.,
G.C.MG., M.V.O., Governor General and Commander in Chief of the Dominion
of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit to Your Excellency a report of the Department of Agriculture for the fiscal year ended March 31, 1922.

The work of the department was carried out in a most efficient and satisfactory manner and there will be found included herein a summary of the operations of the different branches of the department, all of which is laid before Your Excellency under their respective headings.

The legislation affecting the department during the period consisted of:—

Chapter 15, 11-12 George V, intituled "An Act to amend the Animal Contagious Diseases Act." (Assented to June 4, 1921.)

Chapter 28, 11-12 George V, intituled "An Act to regulate the Grading of Dairy Produce." (Assented to June 4, 1921.)

Chapter 41, 11-12 George V, intituled "An Act to amend The Oleomargarine Act, 1919." (Assented to June 4, 1921.)

By Order in Council approved under date April 9, 1921, under and by virtue of the provisions of chapter 6 of the Statutes of 1918, 8-9 George V, intituled "An Act to authorize rearrangements and transfer of duties in the Public Service," the administration of the "Act respecting Agricultural Fertilizers," as amended, was transferred from the Department of Health to the Department of Agriculture as from the 1st day of April, 1921.

By Order in Council approved under date April 9, 1921, the regulations relative to the importation, manufacture and sale of oleomargarine in Canada established by Order in Council of the 30th day of August, 1920, were amended by adding clause (c) to section 15 thereof. (*Vide Canada Gazette*, vol. LIV, p. 4323.)

13 GEORGE V, A. 1923

By Order in Council approved under date March 24, 1921, Regulations under and in virtue of the provisions of section 326 of chapter 53, 10-11 George V, intituled "An Act to amend 'The Inspection and Sale Act,'" were established to come into force on the date of their publication in the *Canada Gazette*.

These regulations were published in the *Canada Gazette* of April 16, 1921. (*Vide Canada Gazette*, vol. LIV, p. 4316.)

The above Order in Council and Regulations were republished, with corrections in the Regulations, in the *Canada Gazette* of May 7, 1921. (*Vide Canada Gazette*, vol. LIV, p. 4760.)

By Order in Council approved under date May 12, 1921, subsection (h) of section 7 of the Regulations under the Destructive Insect and Pest Act, and amendments thereto by Order in Council of May 24, 1920, was rescinded and a new clause substituted in lieu thereof, with a view to the prevention of introduction into Canada of the European Corn Borer. (*Vide Canada Gazette*, vol. LIV, p. 5007.)

By Order in Council approved under date May 18, 1921, the Ministerial Order issued in virtue of the provisions of "The Destructive Insect and Pest Act," 9-10 Edward VII, chapter 31, under date November 29, 1920, quarantining certain areas in the province of Ontario, in connection with the danger of the spreading of the "European Corn Borer" was rescinded and was replaced by an Order in Council containing amendments deemed expedient.

By Order in Council approved under date June 11, 1921, Mr. George H. Clark, Seed Commissioner, an officer of the Department of Agriculture, was appointed the representative of the Government of Canada as the accredited delegate from the Dominion at the International Seed Control Congress held at Copenhagen, Denmark, the 6th to 11th June, 1921.

By Order in Council approved under date November 5, 1921, the Cattle Quarantine Regulations authorized by Order in Council under date November 30, 1909, and amendments thereto were further amended by adding subsection "A" to section 39 thereof—subsection "A" as follows:—

"Cattle from fully accredited herds in the United States accompanied by a certificate signed or endorsed by a veterinarian of the United States Bureau of Animal Industry stating that they are from a fully accredited herd, and have been tested within one year from the date of importation, shall be exempted from the provisions of this section."

By Order in Council approved under date February 4, 1922, the Regulations under "The Animal Contagious Diseases Act" governing the importation of foreign wool and hair, as established by Order in Council of August 12, 1920, and amended by Order in Council of February 21, 1921, were rescinded and new Regulations established in lieu thereof. (*Vide Canada Gazette*, vol. LV, p. 3625.)

By Order in Council approved under date February 4, 1922, the Regulations under "The Animal Contagious Diseases Act" governing the importation of foreign hides, skins and by-products, as established by Order in Council of August, 9, 1920, were rescinded and new Regulations established in lieu thereof. (*Vide Canada Gazette*, vol. LV, p. 3623.)

By Order in Council approved under date February 7, 1922, section 18 of the Regulations under "The Destructive Insect and Pest Act" was amended. (*Vide Canada Gazette*, vol. LV, p. 3503.)

SESSIONAL PAPER No. 10

By Order in Council approved under date February 10, 1922, the Order in Council known as Notice of Quarantine No. 2 (Domestic) P.C. 1625, effected on May 18, 1921, also, the Ministerial Orders known as Supplements Nos. 1, 2 and 3 to Quarantine No. 2, (Domestic) effected respectively on August 26, 1921, September 7, 1921, and October 3, 1921, restricting the removal of corn fodder, etc., etc., from certain areas in the province of Ontario on account of the spreading of the European Corn Borer, were rescinded and new Regulations were substituted therefor. (*Vide Canada Gazette*, vol. LV, p. 3440).

By Order in Council, approved under date February 13, 1922, the Regulations established under "The Meat and Canned Foods Act" were amended. (*Vide Canada Gazette*, vol. LV, p. 3612.)

By Order in Council approved under date March 21, 1922, subsection (a) of section 7 of the Regulations under the "Destructive Insect and Pest Act" established by Order in Council of July 17, 1917, was rescinded and a new subsection substituted therefor. (*Vide Canada Gazette*, vol. LV, p. 4121.)

By Order in Council approved under date March 21, 1922, subsection (h) of section 7 of the Regulations under the "Destructive Insect and Pest Act" amended by Order in Council of May 12, 1921, was rescinded and a new subsection (h) substituted therefor. (*Vide Canada Gazette*, vol. LV, p. 4122.)

By Order in Council approved under date March 21, 1922, subsection (i) of section 7 of the Regulations under "The Destructive Insect and Pest Act" established by Order in Council of April 14, 1920, was rescinded and a new subsection substituted therefor. (*Vide Canada Gazette*, vol. LV, p. 4122.)

SUPERVISION OF RACE TRACK BETTING

By the amendment of Section 235 of the Criminal Code passed in 1920, the supervision of race track betting, under the pari-mutuel system, was placed in the hands of the Minister of Agriculture. The amended section in question was put into operation for the racing season of 1921, and it was decided that betting could be most effectively supervised, if officers of the Royal Canadian Mounted Police were utilized for this purpose. The co-operation of the R.C.M.P. was therefore secured and at all race meetings at which betting is permitted under the law, police officers were present to see that the provisions of Section 235 of the Criminal Code were carried out.

Four parties of police, each consisting of four men, were used, one party covering the Quebec tracks, one those in Ontario, the third in the Prairie Provinces and the fourth in British Columbia. In all, forty-seven race meetings, covering 305 days of racing, were supervised by the Department during 1921. Notwithstanding the fact that all the men employed were new to the work, they performed their duties most efficiently and satisfactorily, and in most cases, received the active co-operation of the racing associations themselves.

DOMINION EXPERIMENTAL FARMS AND STATIONS

The work of the Experimental Farms Branch was carried on actively during the fiscal year ending March 31, 1922, in spite of handicaps arising from shortage of staff and of buildings and equipment. During the year a new Experimental Station was established at Swift Current, Sask., in the heart of the semi-arid portion of that province. At this Station a special study will be made of what are termed "dry farming methods" and possibilities. It was found possible to break a large portion of this Station last year, some of the buildings have been put up, a Superintendent has been appointed, and preparations have been made to commence experimental work this spring coming.

Owing to limited appropriation it was not found possible to do very much work in the way of putting up new buildings on the Experimental Farms during the year just closed, the money available having been devoted to repairs of buildings already existing.

During the year the following publications were sent to the printer:—

Bulletins Regular Series—

No. 98, "Farm Business in Quebec".

Bulletins Second Series—

No. 47, "Commercial Feeding Stuffs".

No. 48, "Bulb and Bulb Bloom".

No. 49, "Nut Culture in B.C."

Bulletins New Series—

No. 1, "Poultry Feeds and Feeding" (reprint).

No. 2, "Bran Shorts, Middlings and Feed Flour".

No. 6, "Results of Experiments at Fort Vermilion, Alberta".

No. 8, "Fertilizer for Field Crops".

Exhibition Circulars—

No. 102, "Silo Construction".

No. 103, "Labour Saving Devices on the Irrigated Farm".

No. 104, "Fertilizer for Flowering Plants".

No. 105, "Bee Diseases".

Circulars—

No. 19, "Manurial Value of Seaweed".

No. 20, "Poultry Experiences at the Experimental Station for Vancouver Island".

No. 21, "Beef Scrap vs. Skim Milk for Egg Production".

Circulars New Series—

No. 1, "Mosaic and Leaf Curl of the Cultivated Red Raspberry".

NOTES ON THE SEASON

Although the winter of 1920-21 was very mild, the percentage of fall wheat winter killed was higher than in the two previous years. The summer of 1921 was marked by very severe and prolonged drought, which seriously affected the grain yield in most of the provinces, while the average yield of hay and clover was the lowest on record. The wheat crop was, as a whole, fair, however, and the yield of Indian corn for ensilage was high, which compensated partly at least for the scarcity of hay. Early fall rains benefited late potatoes, root crops and late pasture, upon

SESSIONAL PAPER No. 16

which cattle were able to graze to a later date than usual. Some data are given in the following tables as to the yields and value of the principal field crops in 1921. In the second table the various classes of live stock in Canada covering the period 1916-1921 are given.

AREAS AND ESTIMATES OF YIELD AND VALUE OF FIELD CROPS, 1921

Crop	Area	Yield per acre	Total yield	Weight per measured bushel	Average price per bushel	Total value
	acre	bush.	bush.	bush.		\$
Fall wheat.....	720,635	21.50	15,520,200	58.77	1.02	15,846,000
Spring wheat.....	22,540,589	12.75	285,337,900	58.10	0.80	227,090,000
All wheat.....	23,261,224	13.00	300,858,100	58.11	0.81	242,936,000
Oats.....	16,949,029	25.25	426,232,900	32.97	0.34	146,395,300
Barley.....	2,795,665	21.25	59,709,100	46.05	0.47	28,254,150
Rye.....	1,842,498	11.75	21,455,260	55.06	0.72	15,399,300
Peas.....	192,749	14.25	2,769,981	59.42	1.96	5,439,400
Beans.....	62,479	17.50	1,089,900	59.30	2.90	3,155,800
Buckwheat.....	360,758	22.75	8,230,100	47.35	0.89	7,285,100
Mixed grains.....	861,136	25.75	22,271,500	41.62	0.62	13,901,220
Flax.....	533,147	7.75	4,111,800	54.34	1.44	5,938,400
Corn for husking.....	296,866	50.25	14,904,000	55.56	0.83	12,317,000
Potatoes.....	701,912	152.75	107,246,000		0.77	82,147,600
Turnips, mangels, etc.....	277,675	347.75	79,150,300		0.44	39,801,080
Hay and clover.....	10,614,951	1.07	11,366,100		23.56	267,764,200
Fodder corn.....	585,395	10.75	6,361,600		7.05	44,880,800
Sugar beets.....	28,367	9.45	268,000		6.50	1,742,000
Alfalfa.....	263,892	2.50	662,200		19.95	13,211,000

NUMBER OF FARM LIVE STOCK IN THE DOMINION, 1917-21

Live Stock	1917	1918	1919	1920	1921
Horses.....	3,412,749	3,609,257	3,667,369	3,400,352	3,813,921
Milch cows.....	3,202,283	3,538,600	3,548,437	3,530,238	3,736,832
Other cattle.....	4,718,657	6,507,267	6,536,574	5,947,142	6,469,373
Sheep.....	2,369,358	3,052,748	3,421,958	3,720,783	3,675,860
Swine.....	3,619,382	4,289,682	4,040,070	3,516,678	3,904,895

In addition to the work on the regular Experimental Farms and Stations, experimental work was continued at the substations at Beaverlodge, Fort Vermilion, and Grouard in Alberta, at Forts Smith and Resolution in the Northwest Territories, at Swede Creek near Dawson, Yukon Territory, and at Salmon Arm in British Columbia. The work at Fort Vermilion has been summarized and reported upon in a bulletin which is going to press at the close of the year, and will very shortly be available to the public. In this publication there is contained a great deal of information which should be of the highest value to prospective settlers in the Peace River District.

THE ANIMAL HUSBANDRY DIVISION

The Animal Husbandry Division has undertaken an increased volume of experimental work during the past year. It has been found necessary to add the services of two assistants to the staff in order that the increasing amount of experimental and routine work, correspondence, etc., might be adequately handled.

HORSES

The stud of pure-bred Clydesdales at the Central Farm is growing steadily and now comprises one three-year-old Canadian-bred stallion, six registered mares, one yearling filly and three foals of 1921. At present writing four mares are in foal to the service of "Iron Signet," an imported son of "Signet," and two to the home-bred three-year-old "Craigie Begg" by "Craigie Knowes" (Imp.).

The use of vaccine in the pre-inoculation of mares and as a prophylactic treatment in foals against joint ill was carried on carefully during 1921. Notwithstanding the above precautions, however, coupled with scrupulous care and attention in reference to disinfection, two foals were lost, one with a typical development of joint ill at four weeks of age—a most unusual case. Thereafter the remaining mares foaled in fresh quarters where horses had never been housed before. No further cases developed. The same quarters, specially disinfected, are being prepared for this year's crop of foals. From every indication, the organism or organisms responsible for joint ill may be carried over in stables for indefinite periods. The use of vaccines must be accompanied by clean foaling quarters.

The force of work horses has been well maintained, being improved in quality and excellence generally, and, in so far as health is concerned, not only were there no losses but the necessity for veterinary service has been limited to one or two calls for minor trouble. The horses have been responsible for 6,908 days' work during 1921-22.

Figures have been obtained with reference to costs of rearing and maintenance and the yearly cost of horse labour reduced to an hourly basis; experimental and test work has been carried on (1) with joint ill vaccines, methods of disinfection, studies of suitable quarters, etc., with reference to the control of joint ill; (2) corn in the ration of the winter-fed working horse; (3) applications best suited to the legs of working Clydesdale horses—several kinds and types of oils were tested.

BEEF CATTLE

During the summer of 1921 no work was carried on in steer feeding. In the month of June, thirty-five steers that had been finished during the winter months under shed and corral feeding conditions were sent to Glasgow. These steers were representative of the class of animal that Canada is able to produce and were in no sense a select, or show lot. Owing to delayed shipment, the price obtained for these steers was considerably lessened as compared with prices a month earlier. The net price received was equivalent to 9 cents in Montreal.

It is interesting to note that these steers, while considered prime for Canadian trade, were slightly unfinished when on the British market. Nevertheless, they were well received and obtained a higher price per pound than a consignment of specially selected and fitted steers from Western Canada. The latter were over-fat. The shipment, in general, was the object of much favourable criticism and some useful figures have been obtained by the division.

It is proposed to feed some four or five cars of steers during the summer of 1922.

DAIRY CATTLE

There has been outstanding improvement in the dairy herds. For several years much trouble has been encountered due to tuberculosis in the herd, persistent reactions being responsible for heavy losses both in regard to individuals and cumulative results in breeding and selection. Apparently, however, the use of, in the first instance, the triple test and latterly the combined test, has been highly successful in eliminating the sources of infection. Up to the present, the herd has passed two tests without evidence of reaction or suspicion and full accreditation is looked for in a few months.

SESSIONAL PAPER No. 10

As formerly, four breeds are represented, Ayrshire, Holstein-Friesian, Jersey and French Canadian, with special emphasis on the three first mentioned. A very good start has been made in the re-establishment of a herd of Jerseys. In all, there are now 150 head of cattle of all ages and breeds.

The herd of reacting cattle operated under the Bang system has given excellent results viewed from every angle. From this herd (made up largely of the best individuals in the herd during the past few years) has been secured an excellent lot of calves which are being successfully raised in the main herd. The adoption of the Bang system with its ensuing success has had much to do with the rapid results attained in rebuilding the main herd.

As in the past, many well-bred, tuberculin-tested calves from tested dams and proven sires have been disposed of to farmers and breeding associations. The general downward trend in prices both with reference to cattle and products has, until the last few months, considerably lessened sales. Latterly, however, there has been a demand for good bull calves and it is interesting to note that buyers show much keener discrimination in regard to breeding and ancestry. Only duly qualified calves are wanted.

A greater number of cattle than before have been qualified in Record of Performance and a number of good Record of Merit tests have been made, in which connection may specially be mentioned the showing of one Holstein cow, with a seven-day record of over 34 pounds and 142 pounds in thirty days.

Experimental Work with Cattle.—A number of experiments and tests have been conducted briefly as follows:—

1. Routine experimental work, including costs of rearing and production.
2. Further test work with abortion treatment, including the use of abortion serum, treatments for retained placenta, sterility, etc.
3. Tests of the feeding value of silage crops—corn versus sunflowers versus peas, oats and vetches. This work, insofar as sunflowers were concerned, was conducted largely to corroborate tests conducted at other Farms and Stations. It was demonstrated clearly that, while sunflower silage is a close competitor of corn, lacking slightly in palatability, it is in general not to be recommended in districts where corn can be grown successfully.
4. Dried beet pulp has been tried out extensively as a replacer of roots, both as a part and as the full silage component in the ration, and also as a direct substitute for meal. This test indicates that beet pulp, where procurable at relatively reasonable prices, is primarily an economical substitute for roots or even silage and that it may with profit be used to replace meal.
- Tests were also conducted as to the best ways of feeding this pulp, dry, soaked in hot and in cold water, and with molasses. Properly prepared, it is highly palatable.
5. A fairly extensive experiment has been conducted in commercial calf-rearing in an effort to ascertain the economy of vealing dairy calves.
6. Further test work has been carried on with milking machines, two new machines having been added to the list. To date, thirteen machines have been tested. Unfortunately, lack of the services of a dairy bacteriologist has made impossible one of the most interesting phases of milking machine test work.
7. Studies and analyses of ventilation systems installed in the cattle barns have been made and much interesting data collected.

THE DAIRY

The splendid facilities offered by the dairy building completed last year have made better work possible in this field. During the present year a well-controlled cheese-curing room has been added.

13 GEORGE V, A. 1923

Experiments have been carried on in the manufacture of new kinds of cheese, resulting in the origination of Meilleur cheese, a product of full flavour and pleasant aroma. This cheese is comparatively simple in process of manufacture, is made in the popular small size and has met with unqualified approval when subjected to discriminating tests. Apparently it will meet with ready demand in a commercial way and will be placed on the market in a limited way at once.

Other varieties of cheese have been manufactured, including Cheddar, cream cheese, Coulommier, Camembert, Wensleydale, etc.

The regular routine work has been carried on, including the handling of milk, the manufacture of butter and cheese and the testing of milk and cream for this Farm and for farmers and dairymen. All Record of Merit testing has been made by the dairyman.

SHEEP

Excellent range facilities have been responsible for improvement in the Shropshire and Leicester flocks kept at Ottawa. In all, there are 147 mature breeding sheep on hand. A high-class, imported Shropshire ram has been added and lambs sired by him are outstandingly good. The flocks have been subject to rigid culling and selection with resultant uniformity of type. The 1922 lamb crop has been up to standard and responsible for over 150 per cent increase. Considerable difficulty was met with, as compared to other years, in disposing of ram lambs of the 1921 crop, this due to the decided drop in values of sheep and sheep products. Many good breeding ram lambs were of necessity castrated.

SWINE

The herds of Yorkshire and Berkshire swine are now in a high state of excellence and reflect the effort that has been put forward during past years in strictly adhering to type and the development of strain and family. There are 209 pigs of all breeds and ages on hand at present. Approximately three carloads of market hogs have been sold and the usual heavy demand for breeding stock met.

Experiments.—Experimental and test work with swine has covered a wide field:—

1. Costs of rearing and production.
2. Comparative tests of Yorkshires, Berkshires, and crosses, from weaning to dressed carcass.
3. Buttermilk versus skim milk versus water-slop for nursing sows.
4. The mineral requirements of the indoor fattening hog.
5. The economy of the pasturing versus the soiling system.
6. Types of buildings best suited to (a) summer, (b) winter feeding.
7. The cause and control of rheumatism in swine.
8. The mineral requirements of the pregnant sow in winter.
9. Beet pulp versus roots for pregnant sows in winter.
10. Tests of commercial self-feeding and watering devices.
11. The effect of self-feeding on the quality of the market hog.
12. The economy of using water heating devices for swine in winter.
13. Further studies in economical housing requirements.
14. Further control work with reference to intestinal parasites.
15. Tests of insecticides, ear marking devices, ear tags, etc., etc.

Full report on all of the above is now being made.

BRANCH FARMS

As in the past, assistance has been given to Branch Farms in the purchase of stock and feeds; the outline, suggestion and criticism of experimental projects;

SESSIONAL PAPER No. 16

collection and correlation of records, experimental and test work; checking and revising reports, etc. All Branch Farms have been visited at least once by the chief officer. Practically no building work has been undertaken.

EXTENSION WORK, PUBLICATIONS, CORRESPONDENCE AND GENERAL ROUTINE

Correspondence has been increasingly heavy. Three new publications are now completed, while two others are well under way. Pamphlets and circulars have been prepared and many press articles published. Assistance has been given farmers and stockmen, as in the past, in the supplying of plans and blue prints. Incidentally, this phase of the work could be greatly extended with more assistance.

The members of the staff of this Division have attended numerous live stock gatherings in practically all parts of Eastern Canada—judging, lecturing, demonstrating and purchasing.

DIVISION OF FIELD HUSBANDRY

Crop yields at the Central Experimental Farm in 1921 were very uneven. Hay and corn gave excellent yields while grain crops on the other hand were very poor indeed. It may be interesting to examine these yields to see if any useful deductions may be drawn.

Hay gave, on a 40-acre field, a yield of 4.8 tons per acre. In view of the very poor hay crops throughout Eastern Canada this yield is very remarkable although it must be stated that the weather at Ottawa was much more favourable for hay production than it was throughout Eastern Canada as a whole. Nevertheless, there were other factors in addition to the favourable weather which influenced the yield, the most important of which was the use of alfalfa along with the regular hay mixture. A small amount of alfalfa seed, in this case six pounds per acre, is included in the regular hay mixture of timothy, red clover, and alsike; this alfalfa, in many years, materially increases the yield. In 1921 three cuttings of hay were secured, the first cutting consisting of a mixture of about equal parts of red clover and alfalfa, the second cutting consisting of a mixture of red clover and alfalfa with the latter crop predominating, while the third cutting consisted exclusively of alfalfa. Owing to the deep root system of alfalfa, it is believed to be able to withstand short periods of drought better than more shallow-rooted crops which are unable to utilize deep subsoil moisture.

Corn gave, on a 30-acre field, a yield of 17.4 tons of ensilage per acre. This crop is more able to withstand periods of drought and hot weather than many other crops. It produces the largest amount of feed per acre of any of the farm crops and while entailing more labour than either hay or grain, the work does not come when these crops are being handled. Mangels gave a yield of 26.5 tons per acre and turnips a yield of 4.9 tons per acre, the latter crop being seriously affected by rot. Neither of these crops and especially the turnips is as satisfactory as corn either in yield of dry matter or in cheapness of production.

Grain crops, with the possible exception of barley, were very poor. Oats yielded 34.7 bushels per acre, wheat 16.2 bushels per acre and barley 37.4 bushels per acre. These crops were grown on good, well drained land, in a three year rotation of corn, grain, and hay, in which the corn crop received an application of manure of 18 tons per acre. Moreover, they were all grown from good seed, were treated for smut and seeded early in the season. Planted under the best of conditions they, nevertheless, produced, with the exception of barley, very poor crops. Extremely hot, dry weather was experienced during the filling period causing the yield to be seriously reduced. It is significant to note in passing, that under these circumstances and on rich soil, barley produced the largest crop; in a cooler season and on less fertile soil, oats may be expected to do comparatively better.

NEW WORK STARTED

A considerably increased programme of field husbandry experiments was commenced in 1921. Several experiments were undertaken in connection with commercial fertilizers in addition to the experiments already in progress along this line. The chief object of these studies is to learn the most economical applications of fertilizers and the crops which respond with the largest profit. An attempt is being made to learn what fertilizers will give the largest profits on land which is left in hay for several years, then ploughed and seeded to oats. Such land will represent millions of acres of farm land which never has and never will receive any farm manure. It will be interesting to learn if commercial fertilizers will make such land more profitable.

Experiments have been commenced with green manure to learn the most profitable methods of utilizing such crops to increase the fertility of the soil. Cultural experiments have been started both on a sandy loam soil and on a heavy clay soil to find the most satisfactory methods of handling such types of soil. Comparisons of various hay crops, including alfalfa and sweet clover, are also being made on these soils.

SOIL MOISTURE INVESTIGATIONS ON THE PRAIRIE

In view of the serious losses occasioned in several parts of the prairie through a shortage of soil moisture, technical investigations have been commenced to learn how such moisture may be more effectively conserved and utilized. Soil moisture is the main limiting factor in crop production throughout the entire prairie and, as the rainfall cannot be regulated, the only controllable factor is the conservation and utilization of the soil moisture in the most intelligent manner.

Deep cans are used for these experiments so that the crops will have normal field conditions. The cans are weighed regularly thus giving definite knowledge on the utilization of the soil moisture. Experiments are being conducted to learn what crops and what rotations are most successful as well as what cultural operations most effectively conserve moisture.

BRANCH FARMS

The Division of Field Husbandry co-operates with the Branch Farms in planning experiments to provide information applicable to various districts throughout Canada. The data collected at various Farms is compiled and summarized at Ottawa in order that more comprehensive information may be secured which will be useful in areas intervening between Branch Farms and to confirm the results secured at each farm. An attempt is made, not only to gain information on problems of immediate concern but also to endeavour to have information available to prevent the occurrence of some problems of the future.

DIVISION OF HORTICULTURE

There is such a great variety of climate in Canada and the temperatures during the winter months play such an important part in determining the success or failure of different kinds and varieties of horticultural plants, that each Experimental Farm and Station has its value in determining what can be grown successfully in the part of Canada it serves. The summers also vary much, and certain plants succeed well where the season is comparatively cool and moist which do not do nearly as well where the summers are hot and dry. On the other hand, certain fruits and vegetables require hot weather to reach perfection. Hence, one important feature of the horticultural work is to determine by actual test what kinds and varieties succeed best, what method of cultivation is most desirable for each

SESSIONAL PAPER No. 16

part of Canada, and, when the information has been obtained, to see that the farmers and also the dwellers in cities and towns get it as soon as possible. Thus the Experimental Farms and Stations are bureaux of information disseminating horticultural knowledge based on experimental work, and it is felt that the number of men and women who now write asking for information is good evidence that they have faith in the work which has been done.

Beginning at the extreme East, the Station at Charlottetown, P.E.I., has good orchards and bush fruit plantations, which fruited well in 1921. All but the very tenderest fruits can be grown on Prince Edward Island, while vegetables and flowers succeed well, and the experiments here have been of great value to the people.

The Experimental Station at Kentville, N.S., serves principally the Annapolis and adjacent valleys where the fruit industry is one of great importance. The work done at this Station is much appreciated by the growers, but the Station is of particular value to the younger men going into the business who look to the Station for definite information in regard to horticultural crops. These men are particularly interested in learning how long it takes fruit trees to come into bearing and how much fruit they may expect from each sort. In 1921 there was a good crop of fruit at the Station, and the experiment under way to determine the relative yields of the different commercial varieties gave some very significant results. From trees planted in 1912 the average yield per tree for the past three years has varied from .910 of a barrel per tree for the Milwaukee to .226 for Crimson Beauty, or over four times as much from the best as from the poorest yielding variety. There are eighteen sorts in this test, including most of the well-known varieties grown in the Annapolis Valley. There is need for apples of lighter colour for the Annapolis Valley, and a test with varieties is being made to try and discover something that will be a marked acquisition. Many cultural and spray experiments are under way.

In northern Nova Scotia the Experimental Farm, Nappan, continues to serve a useful purpose so far as horticulture is concerned by demonstrating that fruits, vegetables, and the finest of flowers can be easily grown in the colder parts of that province.

New Brunswick succeeded in winning the highest award for apples at the Imperial Fruit Show in London, England, in 1921, showing how well adapted this province is to this fruit. At the Experimental Station at Fredericton a large orchard has been established and is now in bearing, in which many varieties are being tested to determine what are most suited for the comparatively cold climate of this province. Among the newer sorts the Melba, originated in the Horticultural Division at Ottawa, gives great promise of being a valuable acquisition. Experiments in vegetables and flowers are also being carried on as at the other Stations.

The Experimental Station, Lennoxville, P.Q., is one of the best places for testing the hardiness of fruits in Eastern Canada as the temperatures are between 40 degrees and 50 degrees below zero in some winters, and much useful information is being obtained in determining the hardiest sorts. Many varieties have been winter-killed, but others have withstood the cold well, and soon it will be possible to recommend certain sorts that can be grown with good success in these colder parts of the Eastern Townships of the province of Quebec.

The horticultural work at the Experimental Station, Cap Rouge, P.Q., continues to give results of value to the district about Québec. While there are large orchards here, vegetables have received much attention as there is a good market for large quantities in the city of Québec.

The orchards at the Experimental Station, Ste. Anne de la Pocatière, are a good demonstration to the people near the St. Lawrence below Québec. Apples succeed better here than at Lennoxville, the temperatures not being so low in

winter, and the European plum succeeds better along this part of the St. Lawrence than anywhere else in the province of Quebec. Many varieties of great interest fruited in 1921. Vegetables and flowers also did well.

There is considerable horticultural work at the Experimental Station at La Ferme, P.Q., on the Transcontinental Railway. It has been shown by the experiments that the hardier vegetables succeed admirably and small fruits do well, and the best varieties of each are being determined. At Kapuskasing, in Ontario, also on the Transcontinental line, somewhat similar experiments are in progress. At both of these Stations the results in the season of 1921 were better than in any previous year.

At the Central Experimental Farm, Ottawa, notwithstanding the exceedingly dry summer, the crops of fruit and vegetables were good on the whole. The many experiments under way were continued, details of which will be found in the Interim Report. The introduction of some of the new varieties of fruits and vegetables originated at the Central Farm is being pushed by offering them for sale, and the demand has much exceeded the supply so far. When nurserymen have these in quantity the sale will be discontinued.

Much attention was paid to vegetables in 1921, as in previous years. There is room for earlier varieties of most vegetables, and, as these are usually the most profitable, efforts are being made to originate such. The introductions of early varieties of sweet corn from the Horticultural Division have meant much to the Prairie Provinces, and the Pickaninny, Sweet Squaw, and Early Malcolm are in much demand. The Alacrity tomato has also done exceptionally well in the colder parts.

Considerable attention has always been paid to the ornamental side of horticulture at Ottawa. This work has been much appreciated, and attracted great attention in 1921. By writing to the Experimental Farm, those desiring to plant their places can get the names of the best varieties. The sample hedges attract a large number of people, who can see, side by side, eighty-four hedges being tested for beauty, permanency, and other characteristics.

Experiments in the greenhouses give results of value to florists and market gardeners.

The correspondence of the division at Ottawa is very heavy and is the best proof that the value of the work being done there is recognized by the people.

In Manitoba there are the Experimental Farm at Brandon and the newer Station at Morden. The horticultural work at Brandon has been of great value to the province, the vegetable garden alone, which is visited by great crowds every year, being a very fine demonstration of the possibilities of horticulture on the prairies. Tree fruits, with the exception of the native plum, do not do well at Brandon, but at Morden apples succeed very well, and already trees are in bearing which were planted there in 1916. The lower elevation in southeastern Manitoba is evidently favourable to the successful growing of apple trees, as they have been fruited at various points. The orchards at Morden are large enough to give a good demonstration of what can be done. Many varieties are under test not only of apples and plums, but of small fruits as well. Vegetables are also a prominent feature of the work.

The long-established Farm at Indian Head, Sask., and the newer Stations at Rosthern and Scott, Sask., continue to serve their districts by experimental work in horticulture. The lists of varieties found best and the methods of cultivation proven most successful have been of great aid to the settlers. This also applies to the work at Lethbridge and Lacombe, the two Alberta Stations. In the Peace River District there are the substations at Beaverlodge, Alta., and Fort Vermilion, Alta., which are doing very valuable work in finding out the best varieties for these districts and any special methods in growing them that are necessary for best success. The season of 1921 was a particularly favourable one for horticultural crops, and in this season and others it has been clearly shown that settlers can raise an abundance of small fruits and vegetables in the Peace River District.

SESSIONAL PAPER No. 16

In addition to the old-established Experimental Farm at Agassiz, there are three other Stations in British Columbia, namely, at Invermere, in the Columbia River valley; Summerland, on Okanagan lake; and Sidney, on Vancouver Island, at all of which valuable horticultural work is being done. Because of the importance of the fruit industry in the Okanagan District, the greatest amount of work is being done at the Summerland Station, where there are extensive experiments in orchard cultivation, irrigation, and variety testing. The trees did well here in 1921, and many are now bearing fruit. Cheaper methods of maintaining orchards are being worked out, and the results this season with vetch and alfalfa have been very promising. Vegetable experiments were continued as usual.

At Invermere Station the climate is rather cold for tree fruits, although some apples and plums succeed. Bush fruits do very well, as do vegetables. The potato succeeds remarkably well here. Horticulture at Agassiz is now a relatively small feature of that Station, but the experiments conducted are of value for the lower mainland of British Columbia, which district it serves. The collection of ornamental trees here is very good, and they demonstrate the very rapid growth in this climate.

At Sidney, on Vancouver island, horticulture is a prominent feature of the Station's work, a great variety of crops being grown owing to the mildness of the climate. Although this is a relatively new Station, a large proportion of the people of the district look to it for definite horticultural information. In 1921 special attention was again paid to growing vegetable seed, as on Vancouver Island the climate is very favourable to the production of both vegetable and flower seed.

THE CEREAL DIVISION

THE SEASON

In many parts of Canada the growing season of 1921 will be remembered as perhaps the hottest for many years. This extreme heat during the critical period of growth of the cereal crops is responsible for the low yields and poor grades in many areas in the Dominion.

The drought in eastern Ontario was extremely bad, although at Ottawa conditions were more favourable than in the surrounding country. At Ottawa, the spring opened early, the latter part of April and the beginning of May being most favourable for spring work. Seeding on light soils was begun on April 14. May was moderately dry with normal seasonal conditions. Heavy rains occurred at the close of the month and at the beginning of June. Towards the end of June the temperatures became abnormal and remained so until well into July. This period was the most critical as it occurred at the time that the heads were filling. This extreme heat advanced the maturity abnormally and greatly decreased the yields; at the same time the humidity of the atmosphere proved very favourable to the growth of plant diseases. August was considerably cooler than June or July, but this moderation of temperature came too late to benefit anything but the very late grain crops.

Many districts of eastern Canada suffered severely from drought, while the prairies were badly affected in some parts, although, at the latter part of June, prospects were for a bumper crop, the drought of July and the excessive rains of September ruined the prospects and greatly lowered the yield and grade of wheat.

TEST OF VARIETIES

The number of plots at Ottawa was about the same as the previous season, namely, 756, of which about 600 were fixed varieties. There were 537 plots of one-one hundred and twentieth of an acre in size, many of which were unnamed sorts produced by crossing and, as yet, not sufficiently studied to be made available to the public.

NEW VARIETIES ORIGINATED AT OTTAWA

It was thought advisable to give names, this season, to about thirty cross-bred and selected varieties which have hitherto been grown under numbers. Only the most promising sorts have been picked out. Further study of these will be necessary before introducing any of them for the use of farmers generally. It is not expected that all the varieties recently named will be given to the public, but only the most noteworthy.

In spite of the considerable number of varieties named and the thousands of new sorts rejected as unsatisfactory, many unnamed kinds still remain which have not yet been subjected to a sufficiently long test. These will doubtless furnish some valuable new sorts after a few years' further study.

It is intended to publish a bulletin in the near future which will include descriptions of and other particulars concerning seventy or more of the best varieties that have been originated or selected and named at Ottawa. This bulletin will include about twenty-nine sorts of wheat, twelve of barley, nine of oats, seven of peas, six of beans, five of flax, and one of each of spring rye, winter rye, emmer and sunflowers.

DISTRIBUTION OF GRAIN SAMPLES

During the winter the usual free distribution of grain samples was conducted. In all, approximately 10,000 samples were sent out, made up as follows: 3,230 oats, 2,900 wheat, 1,090 barley, 30 flax, 850 beans and 1,460 peas.

It is very interesting to note that the demand for Ruby wheat has remained about the same as last year, while that for Marquis wheat has considerably increased. This year, we were able to supply almost all the demand for peas, as our supply was greatly increased by the addition of a recently introduced pea named Mackay Ottawa 25, over 500 samples of this variety being sent out this year.

DIVISION OF FORAGE PLANTS

Great progress has been made during the last two years in again taking up, on an extensive scale, breeding and experimental work with forage plants discontinued to a considerable extent during the war years. Root seed raising has been cut down until only small areas, sufficient to carry on selection and breeding work, are now devoted to this work, leaving the Division more time and land to deal with regular work. During war years however, a great deal of material to serve as foundation stock was collected by Dr. M. O. Malte, and this material came into use in 1920. In that year a large number of individual plants of clovers and grasses were set out and from these many selections and isolations were made in 1921.

VARIETY TESTS

Variety tests were conducted with Indian corn, sunflowers, field roots, annual hay crops, red clover, timothy and western rye grass.

The uniformity of field root varieties has shown great improvement during the last two years although some samples tested still show very undesirable types and lack of uniformity.

BREEDING

Western Rye.—Plots, each containing an average of some 300 individual plants set out in rows 3 feet apart with $1\frac{1}{2}$ feet between plants in the row, were set out in 1920 of 140 varieties of western rye. During the summer of 1921, these plots were cut for hay and seed, and records also taken of the aftermath produced where the cutting was made for hay. As an indication of the variation in yield among varieties it may

SESSIONAL PAPER No. 16

be mentioned that the highest yielding variety, for hay, gave over seventeen times the yield of the poorest variety, and that a high yielding variety for seed gave over ten times the yield of the lowest yielding variety.

Seed was harvested from all lots and a number of the most desirable varieties are being sent to the Branch Farms and Stations for further test in 1922.

Timothy.—Thirty-six lots, each representing a selection from individual plants, were set out in plots for comparative test and seed multiplication. A few additional isolations were made from the plant breeding block planted in 1919.

In 1919 after isolations were made in the breeding block, the balance of the plants were allowed to set seed without isolation, seed from these being harvested in bulk. This seed was sown in comparison with varieties from Sweden and the United States and when harvested in 1921 gave not only a more uniform crop but also a heavier hay yield than the other varieties tested. Seed in bulk was again harvested from the breeding block and will be tested in 1922 at Ottawa and on some of the Branch Farms and Stations in comparison with timothy from Eastern and Western Canada and with varieties obtained from the United States.

Kentucky Blue Grass.—Sufficient seed of two outstanding selections of Kentucky Blue grass was harvested to allow these selections to be sent to several of the Branch Farms for comparative tests.

Orchard Grass.—From a number of individual plants set out in 1920, thirty isolations were made and seed harvested.

Meadow Fescue.—Twenty-eight individual plants were isolated and seed obtained for further trial in 1922.

Miscellaneous Grasses.—A number of isolations were made of Tall Oat grass, Awnless Brome grass, Red Top and Red Fescue.

Red Clover.—Seed was harvested from plots of three selections of a variety of Red clover, which has at Ottawa shown strong perennial tendency. There was also harvested a small quantity of seed from a number of selected plants of this variety. These selections will be tested in 1922 at Ottawa and on some of the branch Farms. In variety tests with Red clover at Ottawa, the Ottawa selection has compared very favourably with other lots tested.

Alfalfa.—A number of individual plants were isolated and additional plots set out from isolations made in 1920 at Ottawa and Summerland.

Field Roots.—The improvement of Yellow Intermediate mangel and Danish Champion field carrot was started some years ago and much progress has been made in improving the uniformity and increasing the dry matter content of these varieties. Last year selections were tested at Ottawa and on the branch Farms and Stations, and gave in all respects very satisfactory results. Of the Ottawa Yellow Intermediate four families (B., D., M., and L.) were tested at Ottawa, which all gave excellent total yields per acre and tested dry matter content as follows: B. 10.57 per cent; D. 13.10 per cent; M. 13.20 per cent; L. 12.60 per cent.

One-eighth acre of Yellow Intermediate mangel, and one-eighth acre Danish Champion field carrot were set out for the production of stock seed last year. Weather conditions were very unfavourable and although a perfect stand of plants was obtained only sufficient seed was harvested to allow for variety tests at Ottawa and on the Branch Farms. Seedlings were also grown from the four Ottawa families of Yellow Intermediate mangel.

Sunflowers.—During the summer of 1920 the Dominion Agronomist collected principally in the vicinity of Rosthern, Sask., a great number of samples of sunflower seed, each sample representing a distinct type. This material was planted in 1921

and a number of selections, isolations and crosses were made to obtain material for carrying out breeding work. Great variation was noted between different lots, for instance in height alone the different lots varied from 1½ to 16 feet.

DIVISION OF CHEMISTRY

The following brief record of the more important phases of work undertaken by the division during the past year will indicate the scope and character of its several activities and serve to emphasize the important part the division is taking toward the improvement of Canadian agriculture.

Educational and Advisory.—This consists largely in correspondence and analytical work for the individual farmer—a real chemical service for the man on the land. The correspondence deals with enquiries relating to soils and their management, liming, manures, the use of fertilizers, feeding stuffs, well waters, etc., etc., and the examinational and analytical work is in connection with samples sent therewith. This is an important and ever increasing branch of work, necessitating the expenditure of a considerable portion of the time and energy of the Division, but it is a wise expenditure, as it directly helps to make the occupation of farming more intelligent and more profitable.

The sample register of the division shows that 4,122 samples were received at the laboratories during the fiscal year ending March 31, 1922. Their classification may be given as follows:—

Soils..	626
Manures and fertilizing materials..	146
Fodders, feeding stuffs, forage plants..	597
Well waters..	300
Samples from Meat and Canned Foods Division..	2,190
Miscellaneous..	263
	<hr/>
	4,122

These include samples sent in by farmers and those collected in connection with our own investigational and control work.

Soils.—A large proportion of the soils received are those sent in by farmers. These are not submitted to a complete chemical analysis, but such chemical and physical determinations are made as will enable a report as to their general nature and fertility, with suggestions and advice as to improvement by drainage, manures and fertilizers, suitability for various crops, etc. The advice is made as practical as possible.

An investigation was begun in 1910 on several of the northwestern Farms and Stations to determine, as far as might be practicable, the influence of cropping, rotations and cultural operations on the fertility of the soil. The plots under experiment were sampled when the investigation was instituted and a second collection has now been made. The analysis of these samples is now in progress and it is fully expected that the results will prove of value in the future management of the soils of the Prairie Provinces.

The analysis of soils first undertaken for the Reclamation Service of the Department of the Interior in 1915, for the purpose of assisting in the classification of the irrigable lands of Southern Alberta and southwestern Saskatchewan, has been continued and excellent progress made. The chief object of this work is the determination of “alkali,” where present, and the results have allowed us to report upon the lands examined as to their suitability or otherwise for cultivation under irrigation.

SESSIONAL PAPER No. 16

Satisfactory progress has also been made with respect to the solution of certain problems incidental to irrigation in the semi-dry belt, e.g., the vertical movement of alkali in heavy clay soils under irrigation and the alkali content of soils as related to crop growth.

Feeding Stuff, Fodders, Forages.—The quality and nutritive value of a considerable number of mill and other feeds found on the market, have been determined. Much interest has been evinced in this matter, as indicated by the number of enquiries and of samples sent in for analysis.

About two hundred samples of the milling by-products of wheat-bran, shorts, middlings and feed flour—collected throughout the Dominion and representative of the general output, have been critically analysed, with the view of furnishing data for the revision of standards of these feeds.

Among forage crops, sunflowers and sweet clover have received special attention. The composition of these plants at several stages of growth has been determined, in order to gain information with respect to the right time for ensiling (sunflowers) or cutting for hay (sweet clover).

Two bulletins have been written and issued during the year from the results of this work: "Commercial Feeding Stuff" and "Bran, Shorts, Middlings and Feed Flours." Both make available to the farming public information that will be of service in the economic purchase of feeding stuffs.

Sugar Beets.—Seed of four approved factory varieties, including seed grown in Ontario and British Columbia, was sown on experimental plots on eighteen of the branch Farms and Stations throughout the Dominion and the product analysed as to the sugar content and purity.

As in past years, the results on the whole were excellent and beets of good quality were obtained from a large number of points. It is manifest from this investigation, now in its twentieth year, that soil and climatic conditions in several of the provinces are eminently favourable to the growth of beets for factory purposes.

Field Roots.—The more important strains, types or varieties of mangels and carrots, as advertised in the catalogues of Canadian seedsmen and grown on the Central Experimental Farm have been analysed. Further assistance has been rendered the Division of Forage Plants by the determination of dry matter and sugar content of specially bred and selected "mother" roots from the experimental grounds, and which subsequently, if the chemical data were found satisfactory, would be used for seed production.

In 1921 results show that the average dry matter and sugar content of the twenty varieties of mangels were 9.73 per cent and 4.00 per cent, and for the thirteen varieties of carrots, 10.7 and 2.83 per cent, respectively.

The Fertilizing Value of Rain and Snow.—This investigation, now in its fifteenth year, indicates that the annual amount of nitrogen in soluble compounds furnished by the precipitation per acre is approximately 6½ pounds—an amount equivalent to that in an application of, say, 40 pounds of nitrate of soda. It is thus seen that the rain and snow have a distinct fertilizing function, more particularly in connection with the all-important matter of soil nitrogen and its maintenance.

Well Waters from Farm Homesteads.—This has always been an important phase of the division's work and we believe it has had a direct influence on the farm water supply throughout the country generally. Of the waters examined during the past year, 24 per cent were reported as pure and wholesome, 18 per cent as suspicious, 36 per cent as seriously polluted and 22 per cent as saline.

Investigational Work With Fertilizers.—Fertilizer experiments have been conducted, as in past years, on a number of the Farms and Stations of the System.

13 GEORGE V, A. 1923

Among the more outstanding results of the year reference may be made to the superiority of superphosphate to basic slag as a source of phosphoric acid for the potato crop but the considerably greater influence of basic slag on yields of hay, especially clover hay. Another important indication from this work is the value of an early application of nitrate nitrogen for stimulating crop growth, particularly grain, especially in cool and backward seasons. The most profitable use of fertilizers has been when the soil is fairly rich in humus, as from moderate dressings of barnyard manure.

Investigation and Control Work for the Meat and Canned Foods Division, Health of Animals Branch.—This work comprises the examination, chemical and microscopical—of samples from the packing houses and canneries of the Dominion and of those submitted in the administration of the Oleomargarine Act. They include lards and compound lards, butters and oleomargarines, denaturing oils, sausages, potted and preserved meats, evaporated and condensed milks, milk powders, canned and preserved fruits, canned vegetables, dried apples, jams and many other articles of food.

The primary object of this work is of course to ensure that those food products conform to government standards of purity; it protects the health of the consumer and at the same time has an important bearing on both our export and import trade in many important food products.

In addition to the work outlined as above and that for the several branches of the Department of Agriculture, investigatory and analytical work for a number of the departments of the Government service, e.g., Customs and Excise, Post Office, Fisheries, Interior and the Soldiers' Settlement Board and the Soldiers' Civil Re-Establishment Commission has been undertaken and reported on.

DIVISION OF BOTANY

In the year 1915 the three prairie provinces, Manitoba, Saskatchewan and Alberta, produced about 390,000,000 bushels of spring wheat on an area of 13,300,000 acres. In 1916 the same provinces produced 196,000,000 bushels on an area of approximately 12,000,000 acres. Allowing for the decrease in acreage in 1916, the average yield per acre in 1915 was 30 bushels as against 17 bushels in 1916.

Most of this decrease in yield was due to grain rust, so prevalent in the year 1916. In round figures the farmers of the West carried, in 1916, a loss of 165,000,000 bushels of spring wheat valued at \$212,550,000. In 1915 the price was considerably lower, viz., 82 cents per bushel; even at that rate the loss amounted to the large sum of \$135,300,000. The above is one of the most striking examples of recent years of the immense national importance of plant diseases.

No city man (and even few farmers) is aware of the extraordinary losses due to plant diseases, and hardly ever realizes that in meeting the increased cost of living he contributes his share towards making good the losses from such causes.

It is obviously an important function of the Department of Agriculture to carry on research on plant diseases. The work of studying and endeavouring to control plant diseases is carried on by this division throughout Canada. Our experts are engaged in securing rust-resistant wheat, a wheat of good quality and high yield similar to our Marquis—but immune to rust. It is hardly necessary to emphasize the importance to Canada should such researches be crowned by reasonable success. The work of the Division includes the study of the principal diseases of all farm and garden crops, as well as those of orchards and forests. Every year commendable progress can be reported, but the work is slow. Thus useful knowledge has been obtained from a study of the constitutional diseases of the potato. The inspection service conducted by this Division proves that Canada can produce excellent crops

SESSIONAL PAPER No. 16

free from yield-reducing diseases. Such knowledge spreads quickly, and many car-loads of certified potatoes leave Canada for other countries, where they are in great demand for seed purposes.

Assistance has been rendered in numerous cases to individual inquirers through the chain of plant pathological laboratories maintained by the Dominion Government in all parts of the country. The division at headquarters has outgrown its present accommodation, and it is hoped that provision for expansion may be possible in the near future in order to take care of the increasing demands for this service. The usual inquiries relating to the eradication of weeds, the identification of poisonous and medicinal plants, etc., were attended to, among other phases relating to economic and agricultural botany.

THE POULTRY DIVISION

The work of the Poultry Division as now carried on on twenty Branch Farms, as well as at Ottawa, is rapidly increasing. Pedigree breeding is now conducted upon each Farm, and at the Central Farm, and at a number of the Branch Farms, all eggs set are from pedigreed parents.

The increase in incubator accommodation has given greater facilities for carrying on investigational work and for the hatching of early stock. It has also been found possible to do a certain amount of custom hatching.

In this connection studies are being made as to the causes of chick mortality and problems of incubation dealing with fertility, death of the chicks in the shells, etc. The influence of certain feeds on the hatchability and vitality of the chicks is also being investigated.

In the brooding work the value of the coal-burning brooder stove has been further demonstrated, and the colony house has again proved itself best adapted for rearing purposes since it can be removed from place to place.

In the feeding of chicks a number of rations comprising home-mixed grains and commercial feeds were compared as to value and utility, especially during the critical stage in rearing chicks covering the first three weeks of their existence. The results were in favour of the home-mixed rations as to crop and as to percentage of chicks raised. This ration consists of one part each of corn meal, oat flour, shorts, middlings, and beef scrap, with one hard-boiled egg to each pound of the mixture.

In view of the decline in the market price of all poultry products and the high cost of feed special attention was given to the question of cheaper rations for poultry. Some of the experiments under this head made a comparison of skimmed milk and beef scrap. It was found that where the former was available at any price up to 50 cents per hundred, it is an economical substitute for the latter.

Where skimmed milk has been given for drink in place of water, better results have been shown, except during very hot weather when both should be supplied. No appreciable increase in egg yield has been shown by the feeding of wet mash, instead of dry. In the comparison of commercial feeds and home-mixed feeds, a slight advantage in egg yield has been obtained from the latter at a lower cost.

The value of breeding for high production by careful and systematic selection and mating has been further demonstrated. The highest official record for Canada was obtained during the past year at the Experimental Station, Invermere, B.C., where a White Wyandotte pullet gave 325 eggs in 365 days. She is a result of six years' breeding work at that Station. At Lennoxville, Que., a Barred Rock pullet laid 301 eggs in the year. More reliable indication, however, of the value of this breeding work is shown in the vast improvement manifest in the breeding stock throughout the whole Experimental Farms System. The stock has now increased sufficiently to enable the distribution at moderate prices of a considerable number

of surplus pedigreed males, which must materially increase the average egg yield of the flocks where used.

The farm egg and poultry account work is showing good results in the interest being manifested by poultry keepers throughout the country. The same may be said of the survey work being carried on in the province of Quebec. Marked improvement in the conditions of poultry keeping are being noted. Mongrel flocks are being entirely eliminated, housing conditions improved, and winter egg production increased. In this work every effort is being made to co-operate with other poultry organizations and a programme has been drawn up which has been accepted by all these organizations as a working basis for poultry work in Quebec for the next five years.

In the work with poultry diseases a survey of the various provinces is being attempted with a view to obtaining definite information as to the prevalence of certain specific diseases such as tuberculosis and chicken pox.

The egg laying contests continue to be a very interesting and valuable part of the work of the division, and entries for the 1921-22 contest were received months in advance of the date appointed and in numbers which necessitated increased accommodation. A marked improvement in the quality of the stock entered for these contests is noted, and some high records are being made both by pens and by individual birds.

An exhibit was shown at a number of poultry fairs during the winter, and in addition most of the exhibits sent throughout the Dominion by the Division of Extension and Publicity included a poultry section.

The staff of the Poultry Division were able to meet in large part the great demand for lectures and demonstrations, and gave some assistance at short courses wherever possible.

THE BEE DIVISION

During the year the Bee Division suffered a severe loss in the death of its former chief, Mr. F. W. L. Sladen, who has been in charge since 1913.

The work of the division has continued to expand. Apiaries were maintained at sixteen of the Experimental Farms. Some of these apiaries have considerably increased in size, especially in the eastern provinces. At Ottawa the number of colonies was increased from fifty to seventy-four, and 9,410 pounds 8 ounces of honey were produced.

Bee breeding experiments were continued and a large number of Italian queens and drones of select parentage were reared at Ottawa. Some of these were taken to Duck Island, in the eastern end of Lake Ontario for isolated mating. Sixty-three queens were successfully mated at the island, of these twenty-five were introduced to colonies at the Central Experimental Farm, the others were distributed to various Branch Farms and private beekeepers. A number of virgin queens of the same stock, also reared at Ottawa were sent out to private beekeepers.

Experiments in the control of swarming by manipulation were also continued as follows:—

(1) By dequeening all colonies preparing to swarm and nine days later destroying all queen cells and introducing young laying queens.

(2) By using an enlarged brood chamber.

(3) By destroying all queen cells every nine or ten days. Methods 1 and 2 are proving very satisfactory. No. 3 requires too much time and labour and is not always successful.

Quick and easy methods for the detection of colonies preparing to swarm were also investigated. The use of a shallow super as an addition to the regular brood chamber appears to be the most promising.

SESSIONAL PAPER No. 16

The experiment of wintering two queens in one hive was again tried and proved to be a successful method for producing a larger force of bees in time for the main honey flow and of carrying over a number of spare queens for use in the early spring.

The comparison of wintering outside in packing cases versus cellar wintering is being continued. In outside wintering single, double, and quadruple cases are used.

Beekeeping under northern conditions was further studied at Kapuskasing. A new apiary was started at Fort Vermilion, Alberta, for the same purpose.

Many samples of diseased brood of bees were received and diagnosed during the year and Exhibition Circular No. 105, "Bee Diseases", was issued.

TOBACCO DIVISION

Upon the whole the season of 1921 was favourable for tobacco growing. The quality of the Ontario crop, especially that of the yellow flue-cured tobaccos, was much above the average. The length of the leaf of the Quebec crop was less than that of the preceding year but the texture was better and the yields per acre as a rule higher.

According to the figures gathered by the Tobacco Division the production of tobacco in Ontario amounted to about 2,400,000 pounds of yellow flue-cured tobacco, 4,500,000 pounds of White Burley and about 250,000 pounds of tobacco of other types. The Quebec harvest was estimated at about 4,500,000 pounds of pipe tobacco, 1,500,000 pounds of cigar tobacco and about 150,000 pounds of tobacco of other types.

The experimental work at the Tobacco Station at Farnham, Que., was conducted according to the plan adopted in 1919. The most important feature of the experimental work is a study of the use of chemical fertilizers together with barnyard manure, with a view to establishing the best and most economical formula. The results of this work covering a period of three years, will be published shortly.

A new variety of tobacco suitable for cigar wrappers, obtained from a selection of Connecticut Havana, was tried for the first time at Farnham. The texture of Connecticut Havana appears somewhat firmer than that of Comstock Spanish but the yield in weight is a little too low to enable one to recommend its substitution under the prevailing conditions.

The demonstration work at Farnham dealt chiefly with the establishment and care of tobacco seed beds and, in a general way, the results obtained in former years were confirmed. The seed beds on the Experimental Station at Farnham were the only ones fully successful in the whole district.

Special attention was given to efforts to reduce the cost of production of tobaccos and certain modifications were tried in the usual methods of harvesting, curing and preparation for the market (stripping and packing). Owing to the new arrangement adopted in the stripping room on the Farnham Station the price of this operation was reduced by almost one-half. In spite of all efforts, however, the cost of production of a crop of tobacco in the province of Quebec still remains quite high, reaching about twelve cents per pound. One can realize the difficult situation in which the tobacco grower of that province finds himself when one compares this figure as to cost of production with price of the best tobacco crops in that province. The average price paid for the best qualities of cigar tobacco scarcely reached twelve cents per pound, while the price of ordinary pipe tobacco varied from six to eight cents per pound. It is evident, then, that the production of tobacco in the province of Quebec should have been considerably lessened during the last two years since the present low price can only arise from a very considerable over-production.

At the Tobacco Experimental Station at Harrow, Ontario, special attention was given towards solving the problems of fuel to be used in the hot-air curing of the tobacco crop. One of the curing barns at the Station was equipped with a special coal burning furnace. The result although encouraging did not quite come up to hopes and the furnaces will certainly require improvement before they can be recommended to replace the present methods of heating, that is, with natural gas or wood.

Among the varieties of tobacco tried a selection of White Burley made by the plant pathologist of the Tobacco Division showed itself strongly resistant to tobacco root rot. The form of leaf of this variety is very suitable, although it approaches that of the White Burley Standup rather than that of the White Burley Broadleaf. A considerable quantity of seed of this variety was gathered which will permit of its rapid propagation if needed.

A variety of snuff tobacco selected by the same official also showed itself resistant to the above disease.

The requests for seed of snuff tobacco are relatively few and, up to the present, growers producing snuff tobacco have not complained of tobacco root rot. However, it is well to know that in case this disease appears, preparation has been made to meet it.

The comparison between methods of applying chemical fertilizers, that is, either in the drill or broadcast, has confirmed the results of preceding years. It has been well established that markedly better yields are obtained when these fertilizers are sown in the drill.

Among the numerous varieties of White Burley tried at Harrow the White Burley Broadleaf and the White Burley Standup continue to prove themselves superior. The former is to be recommended for open and fertile soils where it is desired to avoid the production of too thick a leaf. The Broadleaf to be recommended for gravelly soils or where the fertility is less but where one may obtain, owing to the greater development in size of the leaf, a sufficient yield in weight of crop. Speaking generally, the Burley Standup tends to produce in the curing barn a clearer colour than does the White Burley Broadleaf.

As to cultural processes in the tobacco plantation, the best results were obtained by commencing cultivation to the depth of six inches and gradually lessening this to two inches.

An interesting feature was noted in connection with the mosaic disease of tobacco. This disease has been observed in some plantations and in each case it was found that the plants came from the hot-beds of gardeners who also grew early tomatoes. This would seem to indicate a close relation between the mosaic of tobacco and of the tomato.

The inspection work of the province of Ontario which is carried on in connection with a programme of co-operative experiments with the best tobacco growers was considerably enlarged in 1921. In a general way the results obtained last year in this work confirmed those obtained on the Harrow Experimental Station itself.

Both in the plots on the Station and in the co-operation plots on the plantations of the tobacco growers, the use of chemical fertilizers together with barnyard manure, or in the case of yellow tobacco culture combined with the ploughing under of fall barley, has given excellent results. Generally the expense of the chemical fertilizer has been repaid to the grower two or three times by the greater value of his crop. Moreover, it has been shown that it is possible to increase considerably the yield in weight of the crop without injuring its quality.

During the winter the laboratory work of the division has made considerable progress. The detailed results of this work will be found in the special report of the Tobacco Division.

The experimental area used by the Tobacco Division at the Central Farm, Ottawa, was devoted in 1921 to the comparison of various selections of Comstock Spanish. These selections were made by the Tobacco Division. This work resulted

SESSIONAL PAPER No. 10

in the discarding of one of the more recent selections which was not proving true to type. Among the varieties studied at Ottawa may be mentioned a type of White Burley giving a higher yield, curing with a good colour and the leaves of which are much larger than those of any White Burley cultivated so far in Canada. When one considers that the proportion of weight of rib to that of leaf varies inversely according to the size of the leaf this result is noteworthy.

Two varieties of Maryland selected during the last two years also gave interesting crops, both as to yield and colour. These Maryland tobaccos were fermented in the hot room during the winter and some idea of the aroma obtained. From the evidence so far gathered it is thought that possibly the growing of these varieties in certain parts of Canada may soon be recommended. At the present time the principal aim of the Tobacco Division is to find for this new type a foreign market which will enable it to be grown in Canada in relatively large quantities without causing over-production.

DIVISION OF ECONOMIC FIBRE PRODUCTION

During the fiscal year under review this division has entered upon a more extended field of experimental work and commercial exploitation for the benefit of the Canadian fibre flax growing industry than has been possible since the creation of a separate division for the study of problems connected with flax growing in Canada. The setback suffered by the destruction of the flax mill at the Central Farm in November, 1920, has been more than compensated for by the acquisition, on lease, of a modern and well equipped commercial mill in the heart of the flax growing district of western Ontario. This mill, situated at Clinton, is used mainly for the demonstration of proper manipulating methods, and in this capacity it is already proving of great benefit to surrounding flax growers. In addition to the mill buildings themselves, some three hundred acres of good flax growing land in the immediate vicinity were leased, and this land was sown to fibre flax immediately. Retting and scutching experimental work was also begun at the mill itself.

It should be stated that the 1921 season was an extremely poor one, and owing to an almost continuous drought flax crop failures were reported from many points. Indeed, no less than one-third of the total acreage of flax grown in Canada was cut for conversion into upholstering tow. The poorness of the seasonal conditions, however, was not peculiar to Canada.

VARIETY TESTS

The extensive variety tests already being carried on at the Central Experimental Farm were continued and elaborated. Five different varieties of flax seed were sown in twenty-five different plots, averaging one-tenth of an acre in extent. Numerous variety tests were also conducted at several of the Branch Farms, notably Summerland, B.C., Lethbridge and Lacombe, Alta., Kapuskasing, Ont., Nappan, N.S., Fredericton, N.B., and Charlottetown, P.E.I. The yield at the last-named station stood second from the top, Nappan, N.S., producing by far the highest yield of all, Kapuskasing being third, followed by the Western Stations which produced the lowest yields.

HEMP CULTURE

Efforts have been made to overcome the difficulty of retting the hemp grown in the Prairie Provinces, and for this purpose the chief of the division visited Portage la Prairie and district, where he found that there is not sufficient dew to permit of the process of dew-retting being effectively carried on. A solution which is at present receiving consideration is the installing of the equipment necessary to conducting a rapid water and chemical retting process. Several chemical retting processes are being thoroughly investigated with a view to ascertaining definitely which is likely to be the most suitable. Further information on this question will be available later.

TESTS OF MACHINERY

Several newly-invented machines were thoroughly tested, particularly an automatic combined flax breaking and scutching machine known as the "Boby," and a tow scutcher called the "Economic."

One of the latter machines was purchased by the division after preliminary tests, and is still being subjected to exhaustive trials. So far, both machines mentioned have justified the claims made by their respective manufacturers. The Boby is an English machine, while the Economic is manufactured in the north of Ireland.

GRADING

The system of fibre and tow grading and seed inspection already established, which is proving highly successful, will be continued. Inspectors are rapidly becoming more proficient and there is a decided advance in the uniformity of the different men's grading.

MARKETS

In February last the chief of the division visited the spinning mills of New England in order to secure information on present markets. It was ascertained that the United States is not likely to be a potential market in the near future for Canadian flax in any quantities, due to the adverse exchange rate. It was, therefore, decided by the flax growers to turn their attention in the direction of European markets, in which effort they received the co-operation of the Department of Agriculture, the chief of the Fibre Division visiting Scotland, Ireland, Holland and Belgium during the early summer and taking with him a trial shipment of flax baled by the growers of western Ontario. New European machinery and retting methods were also investigated during this visit.

DIVISION OF ILLUSTRATION STATIONS

The work of the Division of Illustration Stations has been considerably extended. Twenty-two stations were added in the spring of 1921. There are now eighty-six stations in operation, eight are located in British Columbia, twelve in Alberta, twelve in Saskatchewan, thirty-two in Quebec, ten in New Brunswick and twelve in Nova Scotia. Three additional stations were selected, during the summer, in British Columbia and three in Saskatchewan for cropping in 1922.

During the last year there has been more than usual interest taken by the farming public in Illustration Station work. Many requests have been received from farmers' clubs and agricultural societies for the establishment of this work in their districts.

The nature of the work is in itself very variable, as each station is planned to meet the problems of the respective districts. From these stations as centres, the division has endeavoured by practical demonstrations to disseminate information on the undermentioned topics:—

- The systematic rotation of crops and the importance of keeping farm accounts.
- The adoption of better cultural methods.
- Growing clover seed.
- The value of tile drainage.
- The advantages of after-harvest cultivation.
- Introducing mangels and turnips to new districts.
- Introducing new and suitable varieties of grain and encouraging the distribution of good seed.
- The value of planting selected seed potatoes.
- Extending the usefulness and encouraging the growing of corn.
- Demonstrating successful methods of growing and harvesting sunflowers.

SESSIONAL PAPER No. 16

Advice and direction in grading of the dairy herd.

Summer-fallow treatment.

The profitable recurrence of a summer-fallow in a rotation.

The growing of alfalfa.

Encouraging the production of fall rye.

Introducing western rye into the rotations on the prairie.

Introducing sweet clover to prevent soil drifting and to restore humus to the soil.

Encouraging the growing of a farm garden.

Advice and encouragement in the improvement of the farm poultry flock.

Definite progress has been achieved in demonstrating these problems. It may be of interest briefly to outline what has been accomplished on some of the stations. Now that some of these stations have been in operation for five and six years, quite reliable deductions may be drawn as to the progress made.

VALUE OF SYSTEMATIC ROTATIONS

Illustration Station work commenced at New Carlisle, Que., in 1917. The crop yields for that season were as follow: Potatoes, 110 bushels per acre; oats, 31 bushels per acre; timothy hay, 1½ tons per acre. Since that time we have been once over the rotation and the same fields were in the same crop this year as in 1917. Potatoes yielded 230 bushels per acre, oats 53 bushels per acre, and instead of timothy hay only, both clover and timothy hay were cut; timothy yielded 2 tons and clover hay 2½ tons per acre.

DETERMINING THE VALUE OF TILE DRAINAGE

When the Illustration Station was established at Stanbridge East, six years ago, two four-year rotations were laid out. One rotation was partially tile drained, and the other was carefully surface drained. Five years results show that the under-drained land has given an increased yield of 2½ tons fodder corn per acre, 9½ bushels oats per acre, 1,440 pounds of clover hay and 900 pounds of timothy hay. By keeping a careful account of the cost of production on each rotation, for the five years, it has been found that the tile drained land has given an increased profit of \$10.35 per acre per annum.

DISTRIBUTION AND SALE OF SEED GRAIN

Suitable varieties of seed grain have been supplied the Illustration Stations by the Experimental Farm for the province. The uniformity and suitability of these varieties have attracted considerable attention and they are replacing many of the old varieties. The station operators are finding ready sale for their surplus seed. Individual sales amount to from 50 to 800 bushels.

INTRODUCING SWEET CLOVER

Sweet clover contains natural characteristics which render it highly adaptable as a green manure crop for nitrate production. Its deep rooting habit enables it to assist in rendering impervious soils more porous. It also gives promise of being a valuable plant for the humus depleted soils which have a tendency to drift. For the districts where red and alsike clover thrive sweet clover is not being recommended until further data have been made available. Sweet clover has been introduced into some of the rotations on the Illustration Stations in Alberta and Saskatchewan. The crop is being utilized for hay, pasture and ensilage. On the station at Meota, Sask., it was ensiled with good success in a pit silo.

MEETINGS

In order that the communities, where these stations are located, may benefit as greatly as possible by the work, public meetings were held on the illustration field during the summer months. The rotations, cultural methods, crops and varieties grown were discussed with the surrounding farmers. The attendance at these meetings ranged from 30 to 300. Farmers have travelled, to our knowledge, a distance of twelve miles to attend these practical discussions.

DIVISION OF EXTENSION AND PUBLICITY

The activities of the Division of Extension and Publicity during the past year consisted in a continuation of the work carried on during the previous years, together with a number of additional features as herein recorded.

The chief features of the work may be noted briefly under the following heads:—

(1) The collection and supervision of the preparation of material for, and sending out of "Press Articles" to the newspapers of Canada.

(2) The collection and supervision of the preparation of material for "Seasonable Hints."

(3) The issuing of exhibition circulars.

(4) Designing, preparing and placing educational exhibits at fall fairs, seed fairs, corn shows, poultry shows, etc.

(5) Distribution of literature at the various exhibitions visited.

(6) Enlarging of the mailing list.

(7) Attention to applications for literature received through the mails.

(8) The management of a central bureau of lantern slides for the Dominion Experimental Farms system and the preparation of charts for the use of the officers of the Central Farm and the superintendents of the Branch Farms.

(9) The supervision of the preparation of sets of lantern slides with explanatory manuscripts, which are loaned to horticultural and agricultural organizations and other societies and clubs throughout Canada for educational purposes, and attending to applications for and the routing and sending out of these slides.

During the year 1921, 159 "Press Articles" were sent out to Canadian newspapers. An endeavour has been made to have these articles written in a snappy and readable style and confined to 500 or 600 words where possible, as it has been found that most newspapers find more frequent opportunity for using articles of this length than the longer articles. A number of the "Press Articles" sent out during the past year have been in the nature of warnings against new plant diseases and the spread of certain noxious weeds, and have carried at the same time information regarding methods of control.

The publication, "Seasonable Hints," is becoming increasingly popular. A letter received from a rural bank manager, contained the information that many of the farmers in the neighbourhood called frequently for copies of this publication, sometimes asking for it many days previous to the regular date of issue. There were 393,000 copies of the March issue published, which included the English and French in both "Prairie" and "Eastern and B.C." editions.

There were ninety-six Experimental Farm exhibits sent out from the Central Farm and Branch Farms during the year.

SESSIONAL PAPER No. 10

The fairs to which exhibits were sent from the Central Farm were as follows:—

Eastern Circuit—

Charlottetown, P.E.I.
 Fredericton, N.B.
 Woodstock, N.B.
 St. John, N.B.
 Sherbrooke, Que.
 Three Rivers, Que.

Calgary, Alta.
 Edmonton, Alta.
 Vancouver, B.C.
 New Westminster, B.C.
 Victoria, B.C.

Ontario Circuit—

Ottawa, Ont.
 London, Ont.
 Picton, Ont.
 Goderich, Ont.
 Peterborough, Ont.
 Mount Forest, Ont.
 Seaforth, Ont.
 Tavistock, Ont.
 Napanee, Ont.
 Richmond, Ont.
 Newington, Ont.
 Norwood, Ont.

Poultry Shows, East—

Halifax, N.S.
 New Glasgow, N.S.
 Truro, N.S.
 Amherst (Winter Fair)
 Quebec, Que.
 Sherbrooke, Que.
 Hull, Que.

Poultry Shows, Ontario—

North Bay, Ont.
 Englehart, Ont.
 Fort William, Ont.
 Sudbury, Ont.

Western Circuit—

Brandon, Man.
 Regina, Sask.
 Saskatoon, Sask.

Winter Fairs—

Ottawa, Ont.
 Chatham, Ont.
 Rodney, Ont.
 Tilbury, Ont.
 Quebec, Que.

The exhibits staged by the branch Farms and Stations were as follows:—

Charlottetown Experimental Station exhibited at Charlottetown, Summerside, Georgetown, Souris and Egmont Bay; Kentville Station at Windsor; Fredericton Station at St. John, Fredericton and Woodstock; Ste. Anne de la Pocatiere Station at St. Michel de Bellechasse, Montmagny, L'Ilet, Kamouraska and Rimouski; Cap Rouge Station at Three Rivers and Quebec; Lennoxville Station at Sherbrooke, St. Scholastique, Richmond and Colchester; La Ferme Station at Amos; Kapuskasing Station at Sault Ste. Marie, Bracebridge, and Huntsville; Morden Station at Morden and Winnipeg; Brandon Farm at Brandon Agricultural Fair and at Brandon Horticultural Fair; Indian Head Farm at Redvers; Rosthern Station at Prince Albert, and Melfort; Scott Station at Saskatoon; Lethbridge Station at Lethbridge; Lacombe Station at Oyen, Chinook, Youngstown, Hanna, Delia and Big Valley; Invermere Station at Atholmer, Nelson, Nakusp and Creston; Summerland Station at Penticton, Armstrong, Salmon Arm, Kelowna, Peachland, Summerland, Vancouver and New Westminster; Sidney Station at Victoria and Saanichton, and a bee exhibit at a local Fair at Victoria.

The exhibits sent out over the eastern and Ontario circuits featured prominently silos and silage crops, varieties of cereal crops recommended for the districts in which the exhibits were being shown, recommended varieties of fruits, garden vegetables, etc., methods of hatching, rearing, fattening and marketing of poultry, up-to-date methods and equipment in connection with bee-keeping, etc., etc.

The general exhibit designed for the west was prepared at the Central Farm, Ottawa. This exhibit was prepared in such a manner as to be of great educational value to the farmers of the western provinces. Among other things featured were types of silos and silage crops, types of farm buildings, rotations to prevent soil drifting and other suitable grain and forage crops, with recommended varieties of

13 GEORGE V, A. 1923

same, methods of prevention of plant diseases, poultry models, recommended varieties of gooseberries, currants, strawberries, raspberries, celery and other garden vegetables, Canadian-grown vegetable seed, etc., etc. The Branch Farms supplied much of the material used in the exhibits sent out from, and set up by officers from this division.

New exhibit structures were made up and sent out to each of the following Experimental Stations, namely: Charlottetown, P.E.I., St. Anne de la Pocatiere, Que., and La Ferme, Que. Those sent to the first two Stations mentioned were three panel structures, 24 feet in length, while the structure sent to La Ferme was 16 feet in length and consisted of two panels.

It will be readily seen that as most of the larger fairs in Canada were visited and many of the smaller ones, hundreds of thousands of farmers have had the results of the investigational work being conducted by the Dominion Experimental Farm System brought prominently before them. These exhibits have been the means, each year, of bringing large numbers of farmers into close touch with the work of the Experimental Farms, with the result that the numbers of farmers availing themselves of the services offered are rapidly increasing.

Literature was given out upon request by those in charge of the exhibits above mentioned. Mailing cards were kept in view where those interested in particular subjects relating to agriculture could check the subjects upon which they desired literature. These cards have been sent in to the Publications Branch, from which branch the bulletins, pamphlets, circulars, etc., requested have been sent out.

A considerable volume of correspondence has been conducted in giving attention to the applications for bulletins, pamphlets, circulars, etc., which have been received at this office.

During the last year a bureau of lantern slides pertaining to the work of the various divisions of the system has been established in connection with this division. About 1,000 slides have been named, numbered and card indexed. These are used by the officers of the various divisions and the superintendents of the Branch Farms, who may require them in connection with lecture work which they find necessary to undertake. This is already being found to be a great convenience, particularly to the superintendents of the Branch Farms, who are called upon to deliver lectures regarding the results of investigational and experimental work conducted on the Central and Branch Farms. Sets of these slides have already been used by superintendents of Branch Farms from British Columbia to Prince Edward Island.

This division has also prepared, during the last year, a number of charts for superintendents of a number of the Branch Farms and various divisions at the Central Farm on crop rotation, breeding experiments, cereal work, etc., etc. These are found very useful by the speakers who have used them in placing before the farmers, in a very clear manner, information regarding the work being conducted.

During the latter part of 1921 arrangements were made for the preparation of sets of lantern slides, with accompanying lectures, for loaning to agricultural and horticultural organizations and other societies and clubs interested in the subjects treated. Sets have already been prepared on two subjects as follows: "Planting and Care of the Farm Home Grounds," and "Profitable Poultry Keeping." Six sets of each subject have been made up. There are between fifty and sixty slides in each set and the lecture consists of about twenty-five typewritten pages of manuscript which is read as the slides are projected on the screen. No rental charge is made, the only cost to the user being the express charges one way as this division pays the return charges. These slides were ready to be sent out on February 14, and during the six weeks intervening between that date and the last of March, these slides were used at over forty meetings. The records which have been kept regarding the use of these slides show that the average attendance at the meetings where the

SESSIONAL PAPER No. 16

slides have been used has been 148. Many letters of appreciation have been received from the various horticultural and poultry organizations which have made use of these slides.

Numerous other opportunities for extension and publicity work have presented themselves during the year. A number of collections of models of various kinds of farm buildings have been sent out to agricultural workers in charge of short courses which have added greatly to the interest and value of these courses. Collections of seeds have been put up in bottles and properly labelled which have been used in connection with short courses and at meetings held in different parts of the country where seed selection and seed improvement were the subjects under discussion. A few small collections of flax, grains, and forage plants have been placed in attractive cases and set up in a number of schools and college museums during the year. During the past winter a number of poultry house models were prepared and sent to Alberta in connection with meetings which were being held in some of the newer districts of that province. A number of other requests of a similar nature have been given attention during the past year.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

Following a mild and open winter, the spring of 1921 was earlier than usual. Light spring rainfall followed by drought until the middle of July caused a short season for small fruits, a light hay crop, and a grain crop well filled out but short in the straw. The autumn was favourable for work, a larger amount than usual of fall ploughing being done.

The Ayrshire breed of cattle is kept at the Station, the herd now consisting of eighteen head.

Feeding experiments with steers were carried on during the winter in a comparison of different rations. They were divided into four pens and the average profits per steer were: Pen I, \$11.96; II, \$16.86; III, \$14.47; IV, \$15.99.

The poultry work at the Station is devoted mainly to Barred Plymouth Rocks and Single Comb White Leghorns. All birds are trapnested throughout the year, and Records of Performance are kept. The best layers are mated with males from high-producing stock.

The third Prince Edward Island Egg Laying Contest closed on October 28, 1921, and the fourth contest was started on November 1, 1921, with twenty pens.

With bees, the season of 1921 was a poor one, owing to drought and a shortage of clover. Three hundred pounds of surplus honey were produced.

In field crops the yields per acre were as follows:—

Crop	Acres	Bush.	Lb.
Wheat	3.91	28	2
Oats, Banner	5.9	47	2
Barley, Charlottetown No. 80	1.	70	10
Potatoes	1.5	177	14
Manure	1.	578	23
Turnips	4.9	380	24
Clover hay	16.47		114
Timothy hay	4.77		1,057

Some four hundred cultural plots were under operation and some valuable data were gathered. The regular variety testing of cereals was carried on in duplicate plots and multiplying fields of the best sorts were grown and the seed registered and sold to growers.

Variety tests were also carried on with Indian corn, sunflowers, and roots, and two hundred and fifty pounds of Bunchelm Selected Swede turnip seed were produced from club-root-resistant seed obtained from Sweden.

Work with pasture and hay mixtures was continued, three more acres being devoted to this purpose.

With fruits, the orchards came into full bearing and produced excellent crops, but the crops of small fruits were lessened owing to drought. With vegetables, in addition to extensive variety tests, disease-free stock of Irish Cobbler and Green Mountain potatoes was multiplied for distribution.

During the year a machine shed and carpenter shop, 25 feet by 80 feet was erected west of the main barn, and a few minor repairs and improvements made.

At the close of the year, the area of the Station was increased by the purchase of what is known as the "Blake" property, consisting of a residence, farm buildings, farmer's house, and fifty-one acres of land.

During the year a number of breeders' and growers' picnics were held at the Station, and the superintendent addressed a number of Farmers' Institutes and Short Courses throughout the province, attended several live stock conventions, was present at all the county exhibitions and many school fairs, acting as judge in many cases. Station exhibits were prepared and displayed at all county and district exhibitions and at the Provincial Exhibition. These attracted a great deal of attention and much interest was shown therein.

EXPERIMENTAL STATION, FREDERICTON, N.B.

THE SEASON

The winter of 1920-21 was an exceptionally fine one and was followed by a very early spring. Seeding was begun on April 30. Apple trees bloomed ten days earlier than usual, and growth during the early spring was very rapid. May, June and July were very dry. As a result of this late planted potatoes and turnips germinated unevenly and slowly, and hay and grain were only sixty per cent of a crop. In August cooler weather and occasional showers promoted the growth of late grains, corn, potatoes, roots and fruit crops. Good growing weather prevailed during September and October. The crops were harvested in good condition. Winter set in early in November and although fine, was more severe than the preceding winter.

LIVE STOCK

Live stock on the Station are in good condition. Five cows are entered in the Record of Performance. One of these, a Holstein cow, Helen Clover Ormsby, has produced 9,453.1 pounds of milk, testing 3.3 per cent fat, in the first 140.5 days of her first lactation period. Three first cross Shorthorn cows completed their third lactation period and produced an average of 5,559.2 pounds of milk and 212.1 pounds of butter fat in 279.2 days, as compared with 5,317.6 pounds of milk and 219.6 pounds of butter fat produced in 279 days by their dams. Five first-cross Ayrshire heifers completed their first lactation period and produced an average of 5,597.4 pounds of milk and 249.4 pounds of butter fat in 335 days, as compared with 5,862.4 pounds of milk and 228.7 pounds of butter fat produced by their dams as mature cows in 294 days.

FIELD HUSBANDRY

Crop yields were below the average. The average yield per acre of the different crops was as follows: Hay, 1.67 tons; oats, 36.1 bushels; spring wheat, 14.1 bushels; swede turnips, 758.6 bushels; mangels, 463 bushels; ensilage corn, 13 tons; sun-flowers, 12 tons 755 pounds; oats, peas and vetches, 3 tons 327 pounds.

SESSIONAL PAPER No. 16

HORTICULTURE

Horticultural crops yielded below the average. There was a heavy drop of apples during the summer, but the fruit harvested was very clean and of good colour. The average yield of strawberries was only 3,843 quarts per acre. Bush fruits were not half a crop. Potatoes were very free from blight and yielded 98.5 barrels per acre. An experiment with potatoes to determine the value of immature seed showed an average increase of 83.4 bushels per acre for twenty-seven varieties and an average decrease of 76.2 bushels per acre for twelve varieties. The net average increase for thirty-nine varieties using immature seed was 34.4 bushels per acre.

CEREALS

Variety tests were conducted with cereals. Six $1/30$ acre plots of fall wheat came through the winter in good condition and yielded from 25 to $37\frac{1}{2}$ bushels per acre.

FORAGE CROPS

Variety tests were conducted with ensilage corn, turnips, mangels, carrots, sugar beets and sunflowers. An extensive experiment was begun with grasses, clover and alfalfa.

POULTRY

The first New Brunswick Egg Laying Contest ended October 30, 1921. It is worthy of note that the average production per hen in this contest was second highest in Canada. A second contest began the 1st of November.

ILLUSTRATION STATIONS

Nine Illustration Stations are now established in the province. These were supervised by the assistant to the superintendent at this Station in co-operation with the chief supervisor at Ottawa.

EXTENSION AND PUBLICITY

An Experimental Farm booth displaying field and garden crops was arranged at the St. John, Woodstock and Fredericton exhibitions.

EXPERIMENTAL FARM, NAPPAN, N.S.

The crop season for 1921 was earlier than usual; farming operations began on May 6, and were general by the middle of May. Very dry weather prevailed throughout the entire growing season, the total precipitation recorded for the six growing months being 10.51 inches. Most of the crops suffered from the drought and this was most noticeable on poorly tilled fields but wherever a systematic rotation of crops had been followed, the yield was up to the average. Throughout the district the crops were below the average but were harvested in excellent condition.

At this Farm, the acreage under crop was as follows: Hay, one hundred and ninety-four acres; roots, eighteen acres; corn, five acres; sunflowers, four acres; oats, peas and vetches, four acres; mixed grain, nine acres; barley, three acres; oats, four acres; wheat, three and one-half acres; potatoes, five acres; test plots of grasses and clovers, five acres; vegetables, strawberries and bush fruits, four acres; orchard, twenty acres; corn for seed, three-quarters of an acre.

13 GEORGE V. A. 1923

The average yields of farm crops were as follows. Wheat, 20.23 bushels; oats, 36.5 bushels; barley, 17.16 bushels; mixed grain, 23 bushels; ensilage, corn, 4.11 tons; sunflowers, 10.05 tons; turnips, 428.26 bushels; clover hay, 2.09 tons per acre.

As a result of the dry weather, which was accompanied by extreme heat, the crop of small fruits was poor; tree fruits were below the normal crop but were of good quality.

Experimental work in the various branches was continued and as many new projects commenced as funds available would permit. Special attention was given to work in variety tests of potatoes and in cost of production. Very satisfactory data were obtained.

The poultry work, both in the plant and in the contest showed marked progress. Two hundred birds were kept on the plant and two hundred and twenty-two were entered in the contest. The average production per bird and the average cost of feed required in the production of one dozen eggs were as follows: Barred Rock hens, 140 eggs at a feed cost of thirty-three cents per dozen; Barred Rock pullets, 144.2 eggs at a feed cost of thirty cents per dozen; White Leghorn pullets, 151 eggs at a feed cost of twenty-six cents per dozen. In the contest the average production was 130 eggs per bird at feed cost of 28.3 cents per dozen.

Good progress was made in all branches of live stock work during the year. Much data was collected on cost of production in all lines except the finishing of beef cattle but, owing to the shortage of stable room, this work had to be discontinued for the present.

The pure-bred Guernsey herd made a very creditable showing this year. This herd now consists of eight mature cows, three two-year-old heifers, three heifers under one year and two males. The average butter-fat test of the herd is good, being 5.39 per cent.

The pure-bred Shorthorn herd, which was established in 1920, made a fair showing during the year. This herd now consists of seven mature cows, one three-year-old, one yearling heifer, a two-year-old herd bull, and three young bulls, which are for sale for breeding purposes.

The grading-up experiment was continued and most satisfactory results obtained. This herd has now some very promising young heifers. Last year two-year-olds reached the 9,000-pound mark.

In cost of production work last season data were collected on—milk production, rearing of grade dairy heifers to one year and two years of age; rearing pure-bred and grade sheep and returns from these, cost of raising little pigs to six weeks of age, cost of pork production.

Some thirteen acres were summer-fallowed in order to kill weeds and prepare the land for cultural work which is to be started in the spring of 1922.

General repairs to all farm buildings were carried on during the summer. A new reservoir was built, a new water line put into one of the farmhouses, the repair work on the boarding-house completed and the house painted.

During the summer an exhibit was put up at a number of exhibitions and small fairs. The superintendent and assistant attended many agricultural meetings and acted as judges at as many fairs and exhibitions as possible throughout Nova Scotia and New Brunswick. Many excursions visited the Farm during the season.

EXPERIMENTAL STATION, KENTVILLE, N.S.

This Station, established in 1912, has an area of 430 acres of which 65 acres are in fruit, principally apples. The large fruit interests centered in that section of Nova Scotia call for experimental work with fruits, and the endeavour has been to specialize in experimental effort to that end. Orchard fertilization, spraying, and

SESSIONAL PAPER No. 16

general care are the main features of the work. The various fruits such as apples, peaches, pears, plums and small fruits of all the desirable varieties are under test.

Corn silage and clover hay are the principal fodder, and oats the leading cereal, crops grown. The rotation followed is corn, or a similar hoed crop, oats and clover. The experiments with fertilizers and limestone, which have been so extensively carried on by this Station, have been confined to these crops under the three year rotation system. Clovers and grasses and mixtures of these have been extensively tested with the hope of improving the general hay production. The work with potatoes aims at the production of disease free stock of Green Mountain and Irish Cobbler for seed purposes.

A Shorthorn herd of sixty cattle bred and handled with particular regard to the development of the dual purpose animal constitutes the most of the work with stock. Steers are purchased in the fall, and winter fed with comparative rations. An effort has been made to develop a good producing strain of White Wyandotte and Barred Plymouth Rock poultry. The apiary, consisting of sixty colonies of bees, has as its object the assisting of fruit growers in the more general use of the honey bee to insure a better set of fruit, and to promote the honey industry.

EXPERIMENTAL STATION, STE. ANNE DE LA POCA TIÈRE, P.Q.

METEOROLOGICAL OBSERVATIONS

The temperature for the months of April, May, June and July were very much warmer and drier than the corresponding months of the ten years previous. This lack of moisture caused a light growth of hay and grain with early maturity. The grain was all harvested at this Station on August 27.

The precipitation during the months of August and October was greater than that of former years and proved very beneficial to the crops of potatoes, corn, sun-flowers and roots, which surpassed former yields. This late precipitation helped materially to prepare the land for late summer and fall ploughing. The winter was relatively milder and the fields were bare throughout. The spring of 1922 has opened fairly early but seeding is likely to be later than last year.

HORSES

The stud is composed of eight pure-bred Percheron mares, two grade Percherons, three two-year-old pure-bred Percheron females, one two-year-old pure-bred Percheron stallion and two grade Percheron yearlings. The aged horses are used for farm work and breeding. Data to determine the cost of rearing a colt from birth to three years old are among those being collected.

DAIRY CATTLE

The dairy herd is in good condition and is composed of pure-bred and grade Ayrshires. The herd included on March 31, twenty-seven cows and twenty-three immature animals of which 75 per cent are pure-bred Ayrshires.

The herd is used to collect data to determine the cost of milk production and for grading-up experiments. Young stock is used to collect information on the cost of rearing from birth to the time the heifers are in milk. The good pure-bred males are sold in the district to improve the grade herds.

SHEEP

The flock of Shropshires which had been established at this Station was disposed of and a good selection of Leicesters from the Cap Rouge Experimental Station was transferred here. On March 31 the ewes were in good condition and a good crop of lambs is expected.

13 GEORGE V, A. 1923

SWINE

The swine herd is composed of twelve pure-bred Yorkshire sows and one boar.

The sows are mainly kept for the distribution of better pigs in the valley but experiments on the cost of producing pork and methods of housing are conducted. Most of the sows are wintered outside, a method which has given better results than wintering cattle.

ROTATION OF CROPS

So far, three systems of rotation have been followed at this Station, namely, rotations of three, four and five years.

The work in horticulture is subdivided into two sections, namely, the orchard and small fruits and vegetable gardening. The orchard contains over 1,100 trees and gives great promise. The oldest part is now nine years old. The trees have made good growth with few exceptions. The trees are sound and there is indication of a heavy bloom this spring.

The small fruits include varieties of red, black, and white currants, gooseberries and raspberries.

In the vegetable garden, tests are made to determine the best varieties for the district of potatoes, sweet corn, tomatoes, beets, cabbages, cauliflowers, squash, melons, lettuce, onions, etc., etc.

A small start was made during the year in the testing of different varieties of grain. Good results were obtained with the exception of the test with oats, which were badly affected by the extreme drought of the early summer.

Variety tests were carried on with mangels, swedes, corn for silage, sunflowers and with clovers and grasses. The roots and corn did exceptionally well, but the clover and grasses did not do well. Several varieties owing to the extreme drought, gave a very poor yield, while others were winter killed. To date, alfalfa, alsike, white Dutch clover, western brome grass, tall oat grass and orchard grass are the clovers and grasses that best withstood the drought of last summer and the winter killing.

POULTRY

Barred Plymouth Rocks, White Wyandotte and Rhode Island Reds have been kept at this Station during the year, but in future the Rhode Island Reds only will be retained.

Experimental work was carried on to determine the hatchability of eggs when hatched artificially and naturally as well. Feeding experiments are also conducted.

BEES

Three hives only had been wintered in 1920. These came out in good condition in the spring of 1921. To add to this number twelve were bought and increased to twenty-seven during the season. They wintered in good condition with the exception of one hive.

Owing to the very dry summer, the honey crop in the valley was lighter than that of former years. The Station hives produced an average of slightly over 70 pounds per hive.

The extension and publicity work was confined to the writing of a few articles to the Farm Press giving lectures at short courses and other meetings. The superintendent also co-operated in the short courses on the bacon hog given to the agronomists of the province at Montreal.

Four fall fairs were visited in this valley with an exhibit containing models of farm buildings and collections of grains, roots, vegetables and fruits. Several thousands have admired these exhibits. Many questions were answered and considerable literature distributed.

SESSIONAL PAPER No. 16

Close to 200 bushels of seed wheat were sold this spring in this valley, 200 pounds of swede seed were distributed, mainly through the agricultural clubs in several localities, in order to induce the farmers to grow more roots.

This Station being without a superintendent during the summer, no farmers' days or excursions were organized, but, nevertheless hundreds of visitors came to the Station during the year, where they were made welcome and every possible attention shown them.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

THE SEASON

From May right through to September the weather was very dry, hay yields being low in consequence, and live stock suffering from shortage of pasture and water; grain harvests were light, but corn and sunflowers yielded well.

LIVE STOCK

A number of the Ayrshire herd cows entered in the Record of Performance qualified, while others will do so by the end of this lactation period. Six Jersey females were purchased to form the nucleus of a small herd. It is hoped to improve the Shorthorn herd in milking qualities by the use of the bull "Weldwood Lassie's Lad," whose dam, "Jean Lassie," has an official record as a three-year-old of 13,891 pounds of milk. Different lines of steer-feeding experiments were carried on, and for this purpose ninety well-bred two-year-old stockers were purchased. Experiments were conducted in early versus late grain feeding, ground elevator screenings versus corn, oats and screenings, and loose versus tied. Results are to be found in the Station's detailed annual report.

Experiments were carried on in lamb feeding, and much improvement was noted in the size, clip and quality of wool, demonstrating what can be done by the use of good registered sires in the flock. Feeding experiments were carried on with swine, and quite a number of pigs were sold to the farmers of the district for breeding purposes. Experiments in breeding with a view to increased egg production were carried on with the poultry, together with investigations as to the cost of hatching, brooding, rearing and feeding during different seasons. Demonstration work also was carried on regarding poultry house construction, methods of feeding, fattening, selection and sanitation. Fifty birds made records of over 200 eggs each, the highest being 301, while the average per bird for the whole flock was 170. The average for 90 Barred Rocks was 205 eggs.

HORTICULTURE

Experimental work was continued with tree, bush and small fruits as well as with vegetables. During the next few years it is proposed to conduct extensive variety tests with apples for winter hardiness. It is expected that several new varieties of plums will prove satisfactory for the district. The strawberry plantation attained fine condition, despite the drought, and produced a fair crop. Twenty-seven different variety tests of vegetables were conducted, and sixteen cultural experiments.

FIELD HUSBANDRY

Corn and sunflowers for silage and roots did very well at the Station during the year under review, but the yields of hay and grain were below the average. Experiments were conducted with a view to ascertaining the effect of supplementing barnyard manure with fertilizer for corn and sunflowers. Twenty-eight acres of land were summer-fallowed in preparation for plot work with fertilizers and for cultural tests. Two fields have been set aside for a drainage experiment. Three-year, four-year, five-year and six-year rotations were compared side by side, and an area is also being set apart for a pasture experiment, where different methods of seeding, cultivation and fertilizing will be tested.

FORAGE PLANTS

A good stand of perennial red clover was established. Compton's Early ensilage corn made a good showing, as also did sunflowers; seventeen varieties of swede turnips were tested and produced a fairly good crop, while four varieties of sugar beets were grown, yields recorded, and average specimens of each forwarded to the Dominion Chemist for analysis as to sugar content.

GENERAL

A new cottage was built on the Station, also a scale building and an implement shed. Nine-hundred and fifty feet of water pipe were laid, 290 rods of new road were constructed, over 600 rods of new fence, and nearly 5,000 feet of under-drainage were laid. Some land clearing was also undertaken. The Station exhibited at the Great Eastern Exhibition, Sherbrooke, at Richmond, St. Scholastique, etc.

EXPERIMENTAL STATION, CAP ROUGE, QUE

THE SEASON

Weather.—The six months from May to October inclusive, during which plants grow in Central Quebec, were warmer, dryer, and brighter than the average of the last ten years for the same period; the main feature, from a meteorological point of view, was the prolonged drought of the early part of summer.

Crops.—Corn for silage, field peas, potatoes, apples, plums, sweet corn, tomatoes were very good; barley, flax, oats, wheat, cherries, grapes, raspberries, cabbage, ornamental plants were good; field roots, beans, currants, gooseberries, strawberries, celery were medium; hay, also pastures until late summer, were bad. But this refers to Cap Rouge only, as precipitation is undoubtedly one of the main factors in the growth of crops, and local showers, during a prolonged drought, sometimes give a fair crop to a locality distant only a few miles from where a total failure exists.

LIVE STOCK

Horses.—At the end of the fiscal year, there were seventy-nine, all pure-bred French-Canadians with the exception of four. Only ten were at Cap Rouge, the other sixty-nine being used for experimental breeding and housing at the Horse Farm, St. Joachim, Que. Sixteen foals were raised and twenty-six mares are due to foal during the spring of 1922.

Cattle.—The herd, on April 1, 1922, consisted of sixty-six head, all pure-bred French-Canadians. More females have qualified for Record of Performance at Cap Rouge than in any other herd of the breed. These cattle are kept for experimental breeding, feeding, housing, and management.

Sheep.—All the Leicester sheep had to be disposed of, during the present fiscal year, on account of lack of land. Fifty ewes and three rams, all registered Leicesters, were sent to the Dominion Experimental Station, Ste. Anne, at the end of 1921.

POULTRY

Laying Contest.—The third Laying Contest for the province of Quebec is being held at Cap Rouge; sixty Barred Rocks and 110 Rhode Island Reds about divided honours, whilst thirty of the first-mentioned breed were entered by the Station, but for registration purposes only.

Farm Flock.—About 300 Barred Rocks are kept, for experimental breeding, feeding, and housing. A pedigree system was introduced a few years ago which will be a valuable help in throwing some light on the very complicated problem of forming families of heavy layers.

FIELD HUSBANDRY

Crop Management.—Work was continued with projects relating to cost of different field crops, rotations, and a comparison of roots, silage, and hay for the economical production of milk.

Soil Management.—The main experiment is an investigation into the relative merits of summer, autumn, and spring ploughing for silage corn.

CEREALS

Variety Tests.—These are conducted with grains which can be grown in the district. For central Quebec, Huron wheat, Manchurian barley, Banner oats, Arthur peas, Norwegian beans, Novelty flax seem to do best.

Selection.—Selections of Manchurian barley and of Huron wheat, made at Cap Rouge, have now shown decided superiority, for yield, over any other strain or variety of these grains tried at the Station during eleven years.

FORAGE CROPS

Variety Tests.—Results of work covering over a decade show that, for this district, the following can be recommended, until better ones are found: Longfellow corn, Improved Short White carrots, Half Sugar White mangels, Good Luck swedes.

Selection.—Conducted with Quebec Yellow corn, Good Luck swedes, and Grimm alfalfa.

Cultural Work.—Several mixtures of grasses and clover are being tried for hay and pasture, whilst different methods of producing red clover seed are compared.

HORTICULTURE

Fruits.—There are being conducted variety tests of apples, cherries, plums, grapes, currants, gooseberries, raspberries, strawberries, also breeding work with most of these, besides such investigations as cost of establishing an apple orchard, comparison of cover crops for same, and methods of planting strawberries.

VEGETABLES

Over fifty projects receive attention, in vegetables. There are variety tests and breeding work with asparagus, beans, beets, cabbage, carrots, cauliflower, celery, corn, onions, peas, potatoes, rhubarb, tomatoes, turnips, also cultural work with the most important of them.

ORNAMENTAL PLANTS

There are over seven hundred varieties of annuals, perennials, bulbs, shrubs and trees under test.

EXHIBITIONS

Horses, poultry, grain, forage plants, fruits, vegetables, flowers were exhibited in the regular classes at Three Rivers and at Quebec provincial exhibitions. One hundred and fifty-three prizes were won, including diplomas on best French Canadian stallion, on best French-Canadian mare, and on best two collections of apples.

PUBLICITY

Articles were prepared for the press, also for "Seasonable Hints," and bulletins were distributed at exhibitions.

VISITORS

Over 4,000 visitors came to the Station during the twelve months.

EXPERIMENTAL STATION, KAPUSKASING, ONT.

The spring of 1921 was early, work on the land commencing on May 3. The month of June was dry and hot, checking the growth of grain and hay crops, but good rainfall in July stimulated an excellent second growth of hay and late sown grain crops were greatly benefited. October was fine and dry with plenty of moisture in the soil, which was favourable for fall work on the land.

The dairy herd at the Station consists of three grade Holstein and ten grade Ayrshire cows, ten head of young stock, and one pure-bred Ayrshire bull, and the beef herd consists of fifteen Shorthorn grade cows, fifteen head of young stock, and one pure-bred bull. Cheap pasture is furnished by the stump land of the farm, which is seeded down to grass and clover.

With swine nine pure-bred Yorkshire sows are kept for breeding purposes. The flock of sheep consists of eleven pure-bred Shropshire ewes, eleven ewe lambs, and one Shropshire ram. The lamb crop this year was satisfactory, twenty-three lambs being raised from fifteen breeding ewes.

At present there are sixteen horses on the farm, these being kept for the farm work only, no experimental work being carried on.

In field husbandry the year 1921 was notable for the fact that late grains gave heavier yields than did those early sown, owing to drought and frost early in the season. Forty-three acres of oats yielded an average of 35 bushels per acre. Seventeen acres of barley yielded an average of 37 bushels per acre. Hay gave an average of 1.3 tons per acre from 122 acres of meadow. Sunflowers were the most satisfactory ensilage crop, five acres producing an average yield of 19 tons 1,200 pounds per acre. The average yield of roots was low, mangels giving 347 bushels per acre and turnips 368 bushels, while carrots yielded 266 bushels per acre.

An excellent opportunity was afforded for comparing cost of ploughing with a tractor and with horses. The cost of ploughing with the tractor was found to be \$3.85 per acre, while with two horse teams it was \$3.90 per acre on improved land, and \$6 per acre for breaking new land. Only two acres of land were cleared of stumps during the year, but forty-five acres of recently cleared land were broken.

Twenty acres of uniform soil are devoted to an experiment in land drainage. Half of this area is underdrained, the remainder left undrained, to determine the effect of underdrainage on crop production.

The work in horticulture consisted of variety tests of vegetables, small fruits and flowers. The orchard is making slow progress. The trees were set out in 1917 and transplanted to their present location in 1918. One plum tree has commenced to bloom, but no fruit set. Very good yields of raspberries were obtained and a number of varieties of strawberries were set out this year, and a good crop of fruit was obtained from some mixed varieties.

Variety tests with cereals were carried on. In spring wheat the largest yield was obtained from Huron, in barley from Manchurian, in peas from Canadian Beauty. One acre of flax was grown which matured in eighty-nine days, and although checked by drought, gave fibre of good quality and five bushels and thirty pounds per acre of seed.

A commencement was made this year with poultry. One permanent poultry house was built and three portable colony houses.

A new silo was put up during the year, also an office building. A five-ton Fairbanks scales were set up and electric lights were installed in all the Farm buildings, with the exception of the poultry houses and the piggery.

An exhibit from the Station was made at the fall fairs at Sault Ste. Marie, Bracebridge, and Huntsville, and seemed to be much appreciated by the large crowds which attended each fair.

SESSIONAL PAPER No. 16

EXPERIMENTAL STATION, LA FERME, QUE.

The season of 1921 was very favourable. The rainfall during the growing period was sufficient to permit of vigorous growth, but the fall weather was rather wet, rendering root harvesting difficult and delaying fall ploughing. The snow had completely disappeared by April 20 and the first cultural operations were done during the early days of May. The first grain was sown on May 10, some days earlier than the preceding year.

The crops on the Station were as follows, being named according to quantity and quality of yield: Very good: sunflowers, wheat, oats, peas, potatoes, cabbage, citrons, pastures, lettuce. Good: hay, annual flowers, and cucumbers. Medium forage beets, carrots, forage crops, corn for ensilage, muskmelon, and beans. Very small yield: table corn, tomatoes, and onions.

The dairy herd is composed of seventeen head at present, namely, one Ayrshire bull, one registered male calf, eight milch cows, of which two are purebred Ayrshires, and seven calves of various ages, one of them being purebred. This herd is being used in a grading-up experiment in which a purebred bull is used in order to show how the succeeding generations improve in production. Records of feed and cost of milk production are kept. To raise a calf to its time of first calving has been found to cost \$103.37.

There are nine work horses on the Station and two drivers. No experimental work has been carried on with these, but close account is kept of feed consumed and work done. Figuring feed at actual cost, it was found that a horse working ten hours per day at farm work could be fed for fifty-eight cents a day.

The flock of sheep at the Station is made up of twenty-five sheep over a year old and eighteen lambs one year old, all common grades, and two registered Cheviot rams. A grading-up experiment is also being conducted with these. There is a notable improvement in the first generation and the second generation shows almost all the characteristics of the Cheviot breed. An experiment has been commenced with the sheep to determine whether it is best to mate the lambs at six months or at one and a half years of age.

The herd of swine at present is made up of four brood sows and one boar. Part of the pigs raised were sold to farmers for breeding purposes and the others were reserved for feeding experiments.

In poultry, the Barred Plymouth Rock is the breed kept. Feed and laying records are kept, but so far no experimental work has been commenced. It is interesting to note, however, that fifty pullets sent here from a selected flock at the Experimental Station, Lenoxville, laid, during the months of November, December, January, and February, an average of twenty-eight eggs each, while pullets coming from an ordinary flock gave an average of 12.25 eggs for the same period. During the year, sixty-five acres have been cleared and were sown to oats, which were cut for green feed.

The Station made an exhibit at the Amos Fair, composed of model poultry houses, trap nests, root cellar, and showing samples of sunflower ensilage, Indian corn, oats, and peas, with a table comparing yields and analyses. This attracted a great deal of attention.

During the year, a wagon shed was built, the barn was repaired and the windows and doors placed therein. It is hoped to remodel this into a cow barn next year.

EXPERIMENTAL FARM, BRANDON, MAN.

The total rainfall for 1921 at Brandon (22.55 inches) was the largest since 1896 and yet crops suffered seriously from drought. This seeming contradiction was due to bad distribution; there was heavy rain in the spring, and September was the

13 GEORGE V, A. 1923

wettest on record. However from June 20 to August 4 there was no effective rainfall, there being only light showers that never got through the dust. This made poor tillage of grain crops and very early maturity. The abundance of moisture early in the season had made the plants shallow rooted, so that they did not stand the dry weather at all well.

The breeding work with dual-purpose Shorthorn cattle has been continued. The uniformity of type of the herd has been improved in recent years. Records of the amount and cost of milk production are kept. An experiment was conducted in comparing sunflowers with corn for ensilage. Milking cows and growing heifers were used for this experiment. With both types of stock the corn ensilage gave better results, both in the gains made in weight and in the readiness with which the feed was eaten. However, the sunflowers gave sufficiently good results to show their value for silage purposes where corn is not a safe crop.

An experiment in steer feeding was started in the fall of 1921. Two lots of steers, one a little higher grade and more expensive than the other, are being compared to determine which is the more profitable type to feed.

Breeding work with Yorkshire swine was continued and also cross breeding experiments undertaken, using Yorkshire dams and Yorkshire, Berkshire and Duroc Jersey sires. Feeding experiments with pigs have been continued, a test having been made in regard to the use of correctives in addition to a regular grain ration for winter feeding.

The test in comparing Shropshire, Suffolk and Oxford rams as sires in an Oxford grade flock has been in operation several years. The get of the Suffolk ram have again been the heaviest lambs in the fall.

Clydesdale horses are kept and some colts raised. The cost of feeding horses is recorded.

The experiment in crop rotations started in 1911 is one of the main features of experimental work. Very valuable information has been compiled on this subject which is particularly useful at the present crisis in agricultural affairs in this province. Many cultural experiments to determine the best methods of performing the various farm operations are being conducted. These experiments have been extended in 1921 to cover more fully the growing of forage crops, such as corn, sunflowers, sweet clover, alfalfa, etc. Data have been obtained on the cost of producing farm crops of all the kinds commonly grown in Manitoba.

The usual experiments in the testing of varieties of grains, grasses and forage crops have been repeated and extended to include new and promising sorts. Information is available to inquirers as to the best varieties in all lines of farm crops.

Horticultural experiments include variety testing of vegetables, as described above for field crops and the same remarks apply. There are also extensive tests in regard to the best methods of growing the commoner and more important kinds of vegetables. Experiments with fruit, flowers, hedges and shade trees are also conducted.

The Barred Rock and White Wyandotte breeds of poultry are kept, and breeding work is carried on to improve the egg laying abilities of the fowl. Very satisfactory results along this line have been attained. Experiments in poultry raising that have been conducted include the comparison of pullets vs. old hens as egg layers and the testing of incubators and brooders and tests in housing poultry. The Manitoba egg laying contest has been conducted for the second year. Twenty-two pens from various parts of Manitoba were entered and some good records made. The best pen (ten pullets) laid 1,838 eggs in the year.

SESSIONAL PAPER No. 16

EXPERIMENTAL STATION, MORDEN, MAN.

Much effort has been put forth in improving the general condition of the farm. New roads have been opened up and crowned with gravel. The general field work has been done with an aim of freeing the soil of perennial weeds and of viable weed seeds. Rotation work was commenced by allotting 37.6 acres to the four-year Rotation "C". A further 60-acre area, which has been down to Western Rye hay, has been reserved for other rotations and one-half of this field will be, in 1922, devoted to Rotations "D" and "G".

A large lawn was seeded and a good sward was developed by autumn of 1921. Ornamental trees and shrubs were planted on the eastern border of the lawn.

There were nearly thirty acres of certified seed potatoes grown. The purpose of this work is to make available for growers of potatoes, foundation seed stock of first-class quality.

Variety testing was done with fruits, cereals, field corn, and vegetables. Special cultural work was used in the growing of tree fruits, white beans, watermelons and musk-melons.

The herd of Ayrshire dairy cattle did well. The two cows in the Record of Performance test qualified with satisfactory yields; Greenbank Lottie 2nd giving 12,241 pounds milk with 568 pounds butterfat, and Beauty of Elm View giving 11,458 pounds milk with 479 pounds butterfat.

The breeding up of a Hampshire grade flock of sheep by the use of pure-bred Hampshire rams of good type on a nondescript flock of range prairie ewes has seen further improvement.

The poultry department has grown and there are now at the Station pens of the two general purpose breeds, Barred Plymouth Rocks and Rhode Island Reds.

Work with bees has commenced on a considerable scale. The season 1921 proved a good one for honey.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

The crop year of 1921 was not a profitable one for grain growers in this district, since rust and saw-fly damage together with heavy fall rains at threshing time lowered both the yield and the quality of the grain crop very seriously. Forage crops, however, were above average. Seeding commenced during the last week in April and growth was very rapid. Harvest weather in August was ideal, but wet weather in September delayed threshing and prevented a great deal of fall ploughing being done. The moisture condition of the soil, however, for the spring of 1922 is excellent.

There are thirty-one horses on the Farm, twenty of which are purchased Clydesdale mares and fillies, one two-year old Clydesdale stallion of the Farm's breeding, and the remainder are grade colts and work horses.

The herd of cattle consists of eighty-one pure-bred Shorthorns. Thirteen cows which finished lactation periods during the year average 5,618 pounds of milk with an average cost of feed per cow of \$75.84, and a cost to produce one hundred pounds milk of \$1.35. Experiments are being conducted comparing the feeding value of sunflower and corn silage for cows and growing heifers.

With sheep, the grading-up experiments with Shropshires and Oxfords again show marked improvement in both mutton and wool-bearing qualities of the first, second and third cross sheep as compared with the foundation stock. Experiment in lamb feeding were also conducted, all lots showing a small profit over the market value of the feeds.

With swine, Berkshires and Yorkshires are kept. Practically all last spring's pigs were sold to Boys' and Girls' Clubs for swine raising projects. An experiment in housing fall litters showed a straw shelter outside to be fully as good protection as an expensive piggery.

With poultry, the White Wyandottes are the only breed kept, and by careful selection and breeding the flock average has been raised to a highly creditable point. The record of the best laying pullet was 261 eggs in the year. The Saskatchewan Egg Laying Contest was again conducted during the year, the first place being taken by a pen of White Wyandottes.

In field husbandry, four rotations are under trial, one of straight grain growing, and three rotations of mixed farming type. The first-named showed a loss of \$1.22 per acre, the three mixed farming rotations showed profits of \$6.26, \$4.37, and \$3.71, respectively.

An experiment was commenced during the year to determine the value of various summer fallow substitutes, such as sunflowers, corn, oats in double rows with thirty-six inches between the pairs of rows, and millet seeded in the same way as the oats. In 1922, wheat will be sown on this area and the effect of these crops on the wheat noted. With cereals, the regular variety test work was conducted, and also with forage crops.

In horticulture, the yield of fruits except currants was excellent, as was that of vegetables.

No new buildings were constructed during the year, but some painting and repair work was done.

A Saskatchewan Clydesdale Breeders' field day was held at the Farm in July, and a class of farmers' sons from the district was given training in stock judging during the year. The teams of these boys captured practically all the prizes at the judging competition held in Regina in competition with twenty other teams from various parts of the province.

EXPERIMENTAL STATION, SCOTT, SASK.

A snowfall of over twelve inches during the first week of April and cold backward weather and rains from the 21st to the 24th, delayed the commencement of seeding operations until the end of the month. From June 17 to September, the weather was dry—only 2.41 inches of rainfall were recorded.

The pure-bred Percherons have been increased by one horse colt. One young grade Clydesdale gelding was sold to a neighbouring farmer. Five Shorthorn heifers and one bull were received from the Indian Head Experimental Farm. Four of these heifers freshened and the herd has been increased by three heifer calves and one bull. Steer feeding experiments have been conducted. Serious losses from goitre in lambs occurred. Experiments to determine the best method of preventing this loss have been started. Wool prices were unprofitably low but the returns from sales of mutton and breeding ewes totalled \$777.89. Silage was found to be worth \$12.17 per ton as a supplemental feed for feeding lambs. Cross-breeding swine has been extensively followed. Self-feeders for feeding swine have proven profitable. Rape pasture has decreased the cost of producing gains in swine by half a cent per pound.

Crop rotations to include sweet clover and winter rye have been introduced. The cost of production during 1921 showed Western Rye grass hay to cost \$6.33 per ton, sunflowers \$3.50. Wheat and oats cost 88 and 29 cents per bushel respectively.

To the success with small fruits previously reported can now be added a second step forward in the development of some promising strains of native plums. Ripe tomatoes were harvested in the vegetable garden on August 8. Excellent crops of other vegetables including corn, beans and peas were secured. There has been a marked increase in the interest taken in the horticultural work by both visitors and correspondents.

Further experimental work with varieties of cereals have been conducted—first generation registered Marquis wheat and Banner oats were grown and sold to farmers in different parts of northwestern Saskatchewan.

SESSIONAL PAPER No. 16

Sunflowers have outyielded corn grown for ensilage. Tests of varieties of sunflowers and distances apart to grow the plants, best time to seed, etc., have been started. It has been found that sweet clover can be grown with a light nurse crop. Pasture experiments show the sweet clover to have a greater carrying capacity than alfalfa but that stock make the most gains on the alfalfa.

The returns over feed cost from the poultry plant amounted to \$587.15. There has been an increased demand for both breeding stock and hatching eggs.

The midsummer excursions to the Station were unusually well attended and a marked increase in the correspondence has been noted.

EXPERIMENTAL STATION, ROSTHERN, SASK.

The season of 1921 was remarkable for a long growing season and for the greatest rainfall of any year since 1912. The result was a heavy crop reaching full maturity.

In animal husbandry, feed conditions were favourable both for pasture and for the growing of winter feeds.

Feeding experiments with steers were carried on in the winter of 1920-21, but for the first time since these tests commenced in 1913 were conducted at a loss, owing to the abnormal drop in beef prices at the time these steers were finished in the spring. Some very valuable data were, however, gathered from this work both on housing, feeding, and management of beef cattle during the feeding period.

The herd of pure-bred Holstein dairy cattle now numbers seventeen females. The highest producer during the year was a senior three-year-old, which gave 18522.2 pounds of milk in 365 days, with an average test of 3.4 per cent butterfat.

The flock of sheep was reduced to fifty breeding ewes and one ram and from these were raised fifty-two lambs to maturity.

The Berkshire has been the only breed of swine kept until just at the close of the year when a start was made with Tamworths in order to conduct comparative experiments with the two breeds.

In field husbandry, some five rotations have been under way for eleven years, and in this connection careful records are kept of all elements in cost of production. It has been found that the greatest profit over a number of years is derived from a mixed farming rotation, including wheat, oats, barley, hay, pasture, and an intertilled crop such as Indian corn or sunflowers.

Excellent results were obtained in horticulture during the year, and further evidence was obtained that until a windbreak is established, little can be done in horticulture on the average prairie farm for lack of shelter. The simplest means of securing this windbreak is to sow caragana seed where the windbreak is wanted.

The tests with cereals, during the year, did not bring forth any results out of line with those of previous years, except in indicating that Ruby was apparently more rust-resistant than were Marquis and Red Fife. No success had been obtained for three years previous to 1921 in seeding to grasses, but owing to the greater rainfall of that year, all the early seeding of Western Rye grass with a nurse crop caught. A number of experiments involving more than two hundred plots have been laid out with the object of finding out best methods of seeding and best varieties to use of twenty kinds of grasses and clovers. Considerable experimental work was done with sunflowers, a crop which is attracting a great deal of attention especially in those districts where Indian corn is not a sure crop. Some very valuable data were gathered as to the best variety and best cultural methods to follow in growing this crop.

During the year a new dairy cattle barn was built, 36 feet by 50 feet, with capacity for eighteen cows and also containing three box-stalls.

13 GEORGE V, A. 1923

EXPERIMENTAL STATION, SWIFT CURRENT, SASK.

Preliminary steps toward establishing an Experimental Station for southwestern Saskatchewan, were taken in 1920. Some fencing was done in the autumn of that year.

In April, 1921, Mr. T. Chalmers was appointed temporary supervisor under the direction of the superintendent of the Indian Head Experimental Farm. Mr. Chalmers did a large amount of preparatory work, putting the station in shape to begin experimental work in the spring of 1922.

During the season, 460 acres were broken, 300 acres of which was broken shallow and backset. The balance was broken in one operation to a depth of about 6 inches. The entire area was disced into reasonably good condition for seeding.

Twenty-five acres of the early breaking was seeded to oats for feed. Another forty acres was seeded to two varieties of fall rye. In the coming season the remainder of the broken land will be laid down to various rotations and other experimental work.

The breaking, backsetting and discing were done with a Case 15-27 Tractor at an average cost of eight dollars and seventy-five cents per acre.

A house and barn were erected on the farm; a well was sunk, which provides a good supply of water, and all outside fencing was completed.

At present the stock consists of ten work horses, two colts, one cow and one calf. Six of the horses were purchased locally; the other four and the two colts were obtained from the Indian Head Farm.

EXPERIMENTAL STATION, LETHBRIDGE, ALBERTA

The season of 1921 commenced quite favourably. While the previous fall was dry and the winter open, leaving little reserve moisture in the soil, the timely storms of March and April gave the crops a good start. The crop prospects looked favourable until the middle of June but, from then on, grain as well as all other crops deteriorated rapidly. The results at threshing time proved very disappointing and over the greater part of southern Alberta another crop failure has to be recorded for the season just passed.

One rather interesting feature in connection with grain yields that was commonly observed was the fact that spring ploughed stubble land produced so very much better results than fall ploughed stubble land, in fact instances were not unusual where spring ploughing yielded fully as well as summer-fallow. This seasonal condition is accounted for by the lack of summer rains to wet the fallow, while during the winter it, along with the fall ploughing, was blown bare of snow while land on which stubble and weeds were standing caught and retained the snow.

There was comparatively little soil drifting in southern Alberta during the season but cutworms and grasshoppers did considerable damage in many localities.

In the autumn it was late before the ground froze up, allowing ample time to lift potatoes and similar crops.

LIVE STOCK

A feeding experiment started in January, 1921, with forty head of steers, to test the comparative value of alfalfa hay and a mixture of cut oat straw and alfalfa as a roughage was completed. The results confirmed the returns obtained in previous similar tests in that better gains were obtained by feeding the mixture of cut alfalfa hay and good oat straw than by feeding the uncut alfalfa hay.

A feeding experiment with thirty-nine head of steers is now under way to test the value of sunflower silage, corn silage and alfalfa hay as roughage in the production of beef.

SESSIONAL PAPER No. 16

No experimental work is being carried on with milch cows.

The experiment in pasturing sheep in the Crowsnest forest reserve is being continued. The results from the summer pasture so far as the sheep themselves are concerned, were eminently successful. The losses in the mountains were trivial. The ewes came out in excellent condition and the lambs were distinctly larger than range lambs of the same class and age that had been summered on prairie ranges. From a financial standpoint, however, the success of the experiment is, up to the present, somewhat in doubt. The relatively high freight rate on the sheep to and from the mountains has made the cost of the summer pasture rather high.

TWO FARMS

Half the land comprising the Station farm can be irrigated, the other half is above the ditch and, on the latter part, experiments in dry land farming are conducted. In a sense, two experimental farms are really being operated at the Lethbridge Station.

FIELD HUSBANDRY

In field husbandry a number of suitable rotations for both dry and irrigated land are being carried out as well as a very elaborate series of cultural experiments. Another season's data were secured from the fields set aside for the testing of permanent pastures under irrigation.

HORTICULTURE

Two vegetable gardens, one on dry land and the other on irrigated land, were grown although the larger part of the varietal test work was carried out in the irrigated garden. In the variety test of potatoes, Irish Cobbler and Gold Coin led in yield over a nine year period on the dry land and stand well on the irrigated land.

The yield from the small fruits was considerably lighter than usual, owing to the severe weather during blooming time. With the tree fruits Dr. Wm. Saunders cross bred apples were the only ones that bore fruit. The Manitoba seedling plums bore well and the prospects of obtaining a variety that will be hardy here and still produce large, well flavored fruit seem encouraging.

CEREALS AND FORAGE CROPS

The yields on the dry land were extremely low but were satisfactory on the irrigated. Special attention was given to the growing of sunflowers, testing varieties, dates of seeding and methods of cultivation.

POULTRY

The Barred Rock breed is the only one kept. All the birds, both pullets and hens, are carefully trap-nested, the principal object of the work being to develop a good laying strain. The second Alberta Egg Laying Contest was completed in October, 1921, and a new contest started, with twenty-three pens competing.

BEES

At the present time there are eleven colonies. The yields of honey produced per colony continue to be satisfactory. The principal experimental work being carried on is in regard to the best method of wintering. So far our experience would indicate that outside wintering, when proper protection is given, is the most satisfactory.

EXHIBITS AND MEETINGS

An exhibit was shown at the Lethbridge Fair and also at the Annual Flower Show at Calgary. The Superintendent as well as members of the staff addressed numerous farmers' meetings at various points on agricultural subjects.

EXPERIMENTAL STATION, LACOMBE, ALTA.

SEASON

The year under review was the third of a series of dry ones, the May and June drought being especially damaging to hay and wild pasture crops. July rains, however, helped the grain crops, and yields were good.

LIVE STOCK

Scanty fall pastures were responsible for live stock beginning the winter in poor condition. Efforts to improve the individuality in herds and flocks have been continued and data secured as to production costs for beef, mutton, pork, eggs and milk. Experiments have also been conducted to demonstrate the best and most economical methods of housing and feeding. The horses at the Station number fifteen, while the dairy cattle consists of sixty-one head. In the beef herd there are seventy-two head, and the total number of sheep carried over the previous winter was 581. With swine a very successful year has been completed, there being forty-four litters during 1921 (thirty-six spring and eight fall).

FIELD HUSBANDRY

Tabulation of yields of the various field crops has been completed, and comparisons made of corn, sunflowers, and peas and oats for silage crops. Five different rotations were carried on; comparisons and records have also been kept of the cost of producing field crops, with comparisons as to respective cost of using horses and tractors for field work. There have, in addition, been comparative tests of the differing cultural methods for various field crops.

HORTICULTURE

The year's work has demonstrated that, even in a dry season, satisfactory yields—both as to quantity and quality—of bush fruits, strawberries and vegetables can be produced. Very large yields of gooseberries, currants, raspberries, and strawberries of five different varieties were obtained. Also, despite a late spring, a satisfactory quantity of tomatoes was ripened. Variety and strain tests were conducted with these crops, and with vegetables, annual and perennial flowers and trees and shrubs. Comparative cultural tests for all staple garden crops were conducted, and results all round go to show that good farmers' gardens should be as common in Alberta as in Ontario.

FORAGE CROPS

Variety and strain tests were continued with corn, sunflowers, sugar beets, mangels, turnips, swedes and field carrots, together with experiments in thinning. Further, the different cultivated grasses and clovers were compared with the annual forage crops for the production of dry fodder and pasture.

POULTRY

The laying stock (of three breeds) consists of 219 pullets and 66 two-year-old hens. There are also some ducks and geese. Pedigree breeding was commenced this year.

BEES

From six colonies placed in the cellar in the fall of 1920, five strong ones were brought out in April, 1921, the two weakest having been united. In spite of the adverse dry weather, these colonies produced a total of 275 pounds of extracted honey, one colony producing 76 pounds. Two of the strongest colonies were divided, making

SESSIONAL PAPER No. 16

seven colonies to finish the season with. Records were kept on different wintering systems, on summer protective methods and on the use of home grown and imported queens.

GENERAL

Farming conditions during the year were extremely trying, and many farmers have decided to adopt new branches and better methods. Numbers of them have come to the Experimental Station for advice and assistance, the number of visitors being double that of previous years and the correspondence multiplied three times. The adoption of mixed farming and a gradual increase in the number of milch cows, brood sows and poultry kept have been recommended. Much information has also been given as to the most suitable breeds of live stock, methods of handling, suitable crops for grain, hay, pasture and ensilage production, and rotation in which these crops may be produced to the greatest advantage. The extension work consisted of sending an educational exhibit to several summer fairs, exhibiting a carload of fat sheep of seven different breeds at Edmonton, and a car load of hogs of three breeds at Calgary.

EXPERIMENTAL FARM, AGASSIZ, B.C.

THE SEASON

The spring of 1921 opened up fairly early but farming operations were interrupted during the last half of April by heavy rains. May was dry, which afforded excellent conditions to complete seeding. All crops did well during the summer except corn. The early cereals were harvested in August with average yields, while late grains were badly discoloured and sprouted. Roots gave excellent yields as also did hay and pasture crops. A very severe winter set in early in November and continued right up to the end of March. Many roots and potatoes were frozen in pits.

The Clydesdale horses kept on this Farm are in good condition. Two foals were raised last year and five mares are in foal at the present time.

The dairy herd consists of fifty-six head of pure-bred Holsteins. The last of the grade herd was sold during the year. Another successful test for tuberculosis has been passed and the second term as an accredited herd has been entered. Seven R. O. P. records were completed, all by two-year-old heifers except one. The best record was made by Agassiz Walula Sylvia; she produced 16,575 pounds of milk and 670 pounds of butter as a junior two-year-old. On January 21, 1922, Agassiz Segis May Echo freshened in excellent condition. She afterwards gave 121.5 pounds of milk in one day, made 36.69 pounds of butter in seven days and 140 pounds in thirty days.

On account of a milk shortage at certain seasons of the year, only a few Stilton cheese were manufactured. A large number of Wensleydale cheese were made and sold at an excellent profit.

The flock of Dorset sheep has continued in good condition throughout the year. The 1921 wool clip returned 11½ cents per pound net. At the time of writing a good crop of lambs is on hand; thirty-five of these have been put in excellent condition for the Easter market.

The Yorkshire breed of swine is kept at Agassiz. The herd consists of two aged boars, twelve breeding sows and seventy sucking pigs. The results of a self-feeder experiment carried on during the summer show a greater daily gain per pig in favour of the self-feeder lot but cheaper gains from the trough fed group, labour not included.

The Barred Plymouth Rock and White Leghorn breeds are kept. A large number of eggs from each breed was sold for hatching purposes. The first Egg Laying Contest completed here October 31, 1921, was a great success. A pen of White Leghorns won the contest, laying 2,247 eggs in the year. The best individual laid 283 eggs. That the coast section of this province is well suited to poultry is proved by the excellent results obtained in this contest.

A comparison was made between sunflowers and corn for ensilage purposes. The sunflowers gave greater yields than corn when sown in either drills or check rows. Barnyard manure applied in spring on the hay meadows increased the yields from $1\frac{1}{2}$ to $2\frac{1}{2}$ tons per acre. Work in the cereal section consisted of testing two varieties of wheat, eleven of oats, twelve of barley and two of mixed grains. In forage crop work, twelve varieties of ensilage corn, twenty-two of mangels, seven of carrots and three of sugar beets were tested.

The horticultural work done this year consisted of the usual variety tests of potatoes, vegetables, fruits and flowers and experiments in their culture. Considerable cold, wet weather in June and a lack of sunshine generally throughout the season militated against good results and earliness. Rain during the autumn again prevented the saving of seed to any extent and damaged much of the fruit.

Only a minimum amount of temporary fencing was accomplished and no permanent fencing. No land clearing was attempted other than some underbrushing in connection with getting out fuel. A new laying house was built on the poultry plant. The boarding house and some of the houses were painted and redecorated inside. The implement shed was repaired and the horse barn sealed up inside and painted outside.

EXPERIMENTAL STATION, SUMMERLAND, B.C.

The spring of 1921 was early and followed an exceedingly mild winter. The soil was well supplied with moisture and germination was rapid. Growing conditions remained favourable until July, which was very dry as was the first half of August. During this period crops suffered severely, and the supply of irrigation water was very small and irregular. The winter just passed has been one of the longest and coldest on record with very little snow, so that it is feared considerable damage to trees may have occurred.

Steer feeding experiments were carried on during the winter just closed, the comparisons being between shelter vs. no shelter, sunflower silage vs. roots and corn silage. Both lots of steers made excellent gains and profits. Those fed roots did better than those fed sunflower or corn silage.

The sheep on the Station consisted of pure-bred Cheviots and Grade Oxfords, as well as pure-bred Suffolks, of which fourteen were purchased during the year.

In the breeding work with swine considerable trouble has been experienced from hairlessness in litters. Potassium Iodide is being fed to combat this and there is hope that this treatment combined with plenty of exercise given the sows will have beneficial result.

With bees the amount of extracted honey taken from the best hive was ninety pounds and the average per hive spring count eighty pounds.

The experimental work with cereals consists of the testing of varieties of wheat, oats and barley. Many of these tests have now been carried on for six successive years.

In field husbandry systematic rotations have now been put under way. These are probably the first to be practised in the southern interior of British Columbia. Field crop production on the Station is carried on under a seven year rotation with alfalfa the crop five years out of the seven. This is giving very satisfactory results, especially in assisting to build up the soil.

Approximately seven acres are devoted to experimental work with forage crops. Of this area three acres are devoted to breeding, selecting and testing grasses and clovers, the remainder of the land being under a four-year rotation, part of it devoted to test plots of grasses and clovers, experiments with mangel and corn varieties, sugar-beets, etc., etc. Work is also being carried on in alfalfa, mangel and soy bean growing for seed production, and the growing of sunflowers and corn for ensilage.

SESSIONAL PAPER No. 16

In horticulture the orchard showed no sign of winter injury when examined in the spring of 1921. The prolonged dry spell, however, and the shortage of irrigation water made conditions rather unfavourable for growth, but, nevertheless, the growth of the trees throughout the orchard was fairly satisfactory. The six orchards on the Station are being carried on under various cultural methods, such as, clean cultivation, permanent alfalfa, soiling crops, truck crops and the regular farm rotation. A valuable collection of data on the different varieties under test is gradually being accumulated. New varieties of apples, stone fruits, pears and small fruits are all receiving attention, and numerous varieties of vegetables, also annual and perennial flowers, are being tested.

With poultry the White Wyandotte is the breed kept, and the stock carried over from one year to another is all selected after a rigorous culling from trap-nest records and hatching results in their pullet year, attention also being given to type in the selection made. The male birds used are all from dams which registered over 200 eggs in their first laying year. Among the breeding hens being used in the season of 1922 there are the following numbers with the records given:—

Fifty-eight hens with a record of 176 to 200 eggs in their pullet year.

Thirty-seven hens with a record of 201 to 225 eggs in their pullet year.

Nineteen hens with a record of 226 to 250 eggs in their pullet year.

Nine hens with a record of over 250 eggs in their pullet year.

The average number of eggs for the entire flock of 123 breeding hens is 208.4, the highest individual record, 289 eggs.

In the spring of 1921, 50 acres of land lying immediately east of the Station were leased. Twenty-five acres of this area will be under crop this coming year.

During the year there was erected on the Station a plant pathological laboratory to give accommodation to the plant pathologist recently appointed. A horticultural building was also put up, equipped for fruit grading and packing purposes. The concrete basement of this building is divided into four frost-proof compartments, for the purpose of experimenting in the storage of fruit, and equipment will be installed to permit of regulating the humidity of the air in each compartment.

An exhibit from this Station was shown at Penticton, Armstrong, Salmon Arm, Kelowna, Peachland, Summerland, Vancouver, and New Westminster. The Superintendent during the year attended several conventions and meetings of farmers' institutes, and was able during the winter to address a series of meetings throughout the Okanagan and Kootenay districts in co-operation with the provincial horticulturist.

EXPERIMENTAL STATION, INVERMERE, B.C.

The past season opened very mild and with little precipitation. Seeding began earlier than usual, but due to lack of moisture crops did not make rapid growth. The hay crop was above the average, and was harvested under good weather conditions. During the growing season there were many heavy wind storms that affected the crops. The cereal, forage and root crops were harvested in ideal weather, and were up to the average in yield and quality. The precipitation for the year was an inch below the average. The winter has been very severe.

Very good returns were made by the various rotations, and the results again show that potatoes, peas and clover are the money-making crops for this district. The results on the dry land farming were negligible, and point quite conclusively to the necessity for irrigation.

The horticultural work progressed very well during the past season. Considerable experimental work was undertaken with potatoes. Garden peas are a very outstanding crop, and some selections from seedlings are very promising. Further crosses with peas were made with outstanding varieties. Good results were obtained

13 GEORGE V, A. 1923

from the variety tests of garden vegetables. Small fruits do very well, but are late, and are at a disadvantage on the open market. Tree fruits are only to be recommended for home and garden planting.

Marquis wheat, Banner oats and Gold barley lead in the respective cereal tests. Prussian Blue was again the highest yielding pea, the opportunity there is for the farmer with this crop may again be pointed out.

With forage crops, the clovers and grasses have outyielded the alfalfa and grasses. Good yields of corn and sunflowers were obtained, but roots were only a fair crop.

On the poultry plant a profit of \$3.16 per bird over the cost of feed was obtained from a pen of White Wyandottes. One of the birds, "Lady Dot", E. 3, produced 325 eggs during the year. Experimental work with pedigreed trap-nesting, hatching and rearing is being continued.

The past season has been a poor one for the beekeepers, and the apiary output was considerably lower this year. The net profit per hive was \$11.65, which is the lowest of the past five years. Good results are following the introduction of the Kootenay hive-case.

The Station exhibit was shown at four local fairs, and considerable interest was shown, as indicated by the enquiries received, and the number of bulletins and circulars given out.

EXPERIMENTAL STATION FOR VANCOUVER ISLAND

SEASONAL NOTES

The spring of 1921 was somewhat backward owing to the sodden condition of much of the soil throughout the district. The summer was cool with consequent slowness of vegetation. The annual wet season was earlier than usual, which interfered somewhat with the harvest, but most of the crops were gathered without loss. Hay was a good crop throughout the district as were the cereals and roots. The fruit crop was not up to the average, although pears and cherries did well at the Station. The winter of 1921-22 was cold for the island. Little snow fell, but frosty weather was carried well into the spring, so that all plants were slower in developing than other years.

LIVE STOCK

Horses.—In addition to the four work horses reported in former years another horse has been purchased for general work in the horticultural division and poultry department.

Cattle.—Some changes and additions have been made in the dairy herd. Some outstanding Jerseys have been purchased.

Swine.—No swine are being kept at the Station as yet, owing to lack of housing accommodation.

Sheep.—A small flock of Southdowns has been purchased as a beginning in the sheep industry. These animals were obtained from one of the best breeders in Ontario.

Poultry.—The work of the poultry division has been maintained at a high standard. All previous records at this Station have been broken with "Saanich Belle". This pullet laid 307 eggs in her pullet year.

HORTICULTURE

The experimental orchards have received considerable attention. Many varieties of pears and cherries, new to the district, have come into bearing and promise much in that the season for both of these fruits has been considerably lengthened, in fact it has been found possible to offer pears for sale during much of the winter. The small fruits, the vegetable garden and ornamentals have all received attention.

SESSIONAL PAPER No. 16

APIARY

A few colonies of bees have been kept for several years at the Station to determine the value of the district as a honey producing section. Cloudy weather and cold nights are not conducive to success with bees, yet considerable success has followed the efforts in this direction. About 60 pounds of surplus honey, spring count, was taken from each hive.

GENERAL

A cottage for the farm foreman was built, and the buildings already at the Station have been kept in repair. An exhibit was put on at the fair in Victoria and at several local fairs on the southern part of the island.

DAIRY AND COLD STORAGE BRANCH

THE PROGRESS OF THE DAIRYING INDUSTRY

The season of 1921 was very unfavourable for milk production over large sections of Ontario and Quebec. The quantity of cheese produced was practically the same as in 1920, in spite of the extreme summer drought in the principal cheese producing districts. Had the season been favourable the production of cheese would have shown a large increase. The output of creamery butter increases year by year in all the provinces. The total production in 1920 was 111,691,718 pounds.

The production of condensed, evaporated, and powdered milks fell off during the year in sympathy with decreased demand for these products in the world's markets, and milk formerly used for this purpose was diverted to cheese factories. Old cheese factories were re-opened, and new ones were built in territory contiguous to the large condensing plants that had either been closed entirely or were operating with greatly reduced output.

Farmers who are engaged in dairying naturally feel that even with cheaper feeding stuffs the returns from milk production are smaller than they were under war prices, but the view is generally held that milk production yields as good a return, if not better, than most other lines of farming in this country.

The following table will serve to show the extent of the dairying industry and the different purposes for which the milk is used. The figures are for 1920, as the returns for 1921 are not yet available:—

TOTAL PRODUCTION, QUANTITIES AND PERCENTAGES OF MILK USED IN CANADA DURING 1920 FOR DIFFERENT PRODUCTS

Product	Quantities	Value	Milk used	Per cent
		\$	Lb.	
Cheese..... lb.	119,201,856	39,100,872	1,641,220,416	16.25
Creamery butter..... "	111,691,718	63,625,203	2,568,909,514	25.43
Dairy butter..... "	125,000,000	56,250,000	2,875,000,000	28.45
Whey butter..... "	1,516,932	757,156		
Condensed milk..... "	53,662,699	10,202,230	134,156,747	1.33
Evaporated milk..... "	30,469,642	3,809,653	76,174,105	0.75
Condensed coffee and cocoa..... "	531,451	147,052	1,328,627	0.01
Condensed skim-milk..... "	363,294	18,723		
Milk powder..... "	7,574,669	2,178,176		
Sterilized milk..... "	7,603,927	785,014	7,603,927	0.07
Casein..... "	109,958	19,233		
Ice cream..... gals.	5,775,879	8,471,031	115,517,580	1.14
Cream sold..... lb. b. fat	7,379,131	6,533,098	210,832,314	2.09
Milk, used as such.....		72,000,000	2,472,000,000	24.47
Buttermilk sold.....		306,235		
Cheese, skim-milk, whey and whey cream.....		452,009		
Total		264,655,715	10,102,748,230	100.00

MARKET PRODUCTION

The year was marked by a very pronounced decline in prices, but at the time of writing the international market situation shows signs of improvement. The large stock of "government" butter, which had such a bearish effect on the market in the United Kingdom during the greater part of the past year, has all been disposed of, and the exchange situation is very much better than it was a year ago. Lower prices have encouraged a large consumption in countries where money is available to pay for dairy products. There are indications that the consumption of milk, butter and other dairy products has been considerably increased in Canada.

The continued increase in the exports of butter and cheese from New Zealand is not without some influence on the situation. On the other hand the exportable surplus of dairy products in the United States has been greatly reduced as compared with the war period. On the whole the world's market looks rather better than it did a few months ago.

THE FINCH DAIRY STATION

The commercial department of the Finch Dairy Station has had another successful year. The total quantity of milk received was 6,586,485 pounds, as compared with 5,570,545 pounds in 1920 and 2,069,281 pounds in 1912, the first year of operation. The station is now the largest cheese and butter factory in eastern Ontario. The fact that the revenue exceeds the expenditure proves that government institutions may be operated at a profit.

The encouragement of winter dairying has always been one of the important objects in view in the management of the Finch Dairy Station. During the period from December, 1912, to March, 1913, inclusive, the total quantity of milk received was only 208,937 pounds, while during the same period in 1921-22 there was received 1,404,739 pounds, an increase of over 400,000 pounds over the previous year.

The Finch Dairy Station serves to keep the Dairy and Cold Storage Branch in close touch with practical problems relating to the manufacture of butter and cheese, and the operation of cheese factories and creameries. It also serves a useful purpose in providing facilities for testing out new apparatus, new processes of manufacture, and for the carrying on of experiments in the manufacture of butter and cheese. Owing to the greatly increased supply of milk it has been found necessary to make an addition to the building and equipment.

COW TESTING

During the year 1921 the cow testing work was carried on under the policy adopted in 1918. The owners of the herds supply the necessary equipment to weigh the milk and to keep samples taken on three days during each month. Arrangements are made with some qualified person to test the samples of milk, and to forward the results to headquarters, where they are compiled and the records distributed to the persons interested.

The active co-operation of the dairy inspectors in the province of Quebec, and the dairy instructors and district representatives in the province of Ontario during the early spring months, resulted in a large increase in the number of cows being placed under record.

In accordance with the policy laid down in the spring of 1919, under which an offer was made to turn over the work to the provincial authorities at any time, the provinces of Saskatchewan and Manitoba have assumed responsibility for cow testing within their borders.

In addition to the keeping of records of milk production the farmers are encouraged to keep records of cost and quantities of feed consumed, forms being supplied for that purpose.

SESSIONAL PAPER No. 10

The following table indicates the number of cows under test in the different provinces in 1921.

TOTAL NUMBER OF HERDS, COWS, TESTING CENTRES AND TEST SAMPLES, BY PROVINCE, 1921

Province	No. Herds	No. Cows	No. of Testing Centres	No. of Samples Tested
Alberta	65	793	27	3,924
British Columbia	10	163	5	691
Manitoba	176	1,173	34	2,858
New Brunswick	111	822	14	3,553
Nova Scotia	328	2,119	46	9,685
Ontario	761	9,279	93	39,557
Prince Edward Island	198	1,227	19	7,017
Quebec	3,499	32,225	473	127,462
Totals	5,188	47,801	711	194,747

The foregoing figures show an increase of 1,341 herds and 14,419 cows over the previous year.

In addition to the records which have passed through the office of the Dairy and Cold Storage Commissioner, many hundreds of forms are sent to individual farmers who do their own testing and keep their own records. The influence of this work extends greatly beyond the limit of those who are included in the records.

THE GRADING OF DAIRY PRODUCTS

The Dairy Branch again graded cheese for sale by auction at Montreal during the season of 1921.

The Dairy Produce Act, passed during the 1921 session of parliament, authorizes the Governor in Council to make regulations to govern the grading of dairy produce for export. A conference of representatives of all branches of the dairy industry throughout Canada was held at Ottawa on the 7th and 8th of March for the purpose of considering regulations under the Dairy Produce Act. Definite standards for the grading of butter and cheese were adopted, and the regulations were considered at some length.

A number of the delegates, especially those representing eastern Ontario cheese boards and exporters located at points outside of Montreal, came to the conference to oppose the principle of grading, but after hearing the matter discussed they found there was nothing to be opposed to, and a resolution approving of grading was passed with only one dissenting voice.

The proposal to grade all dairy produce for export has been approved by the dairymen's association in all the provinces, by the Canadian Creamery Association, the Canadian Produce Association, the Montreal Produce Merchants' Association, and the National Dairy Council. It is expected that the Department will be in a position to grade all dairy produce for export during the coming year.

DOMINION EDUCATIONAL BUTTER SCORING CONTEST

The Dominion Educational Butter Scoring Contest inaugurated in 1919 was continued in 1921. This work appears to be of service to the creamery men, and receives their hearty support, as well as the co-operation of the provincial officials.

ADMINISTRATION OF DAIRY LAWS

During the year under review there were one hundred and forty convictions for infractions of the Dairy Industry Act and the Oleomargarine Act of 1919. There were twenty-seven cases of confiscation of products, material or apparatus.

The most common violation of the law is that of excess water in butter, the legal limit of which is 16 per cent.

DAIRY MARKET INTELLIGENCE

The Extension of Markets Division of this branch issues a Dairy Produce Market Report throughout the dairy manufacturing season. A weekly letter is despatched every Monday, giving the latest information from the Montreal and Toronto markets up to noon of that day. Paid lettergrams are sent on Monday and Friday evenings to certain specified officials in the different districts, who are then in the position to give the information by telephone, or otherwise, to salesmen in their immediate vicinity. Similar collect lettergrams are sent to any person who requests to have his name put on the list.

DAIRY NEWS LETTER

The circulation of the monthly Dairy News Letter published by this branch continues to increase.

It is a very useful medium for the prompt dissemination of items of news of interest to those engaged in the dairying industry.

CARGO INSPECTION

With a return to more normal conditions in shipping circles the cargo inspection service has been fully re-established on the pre-war basis. An additional inspector was added to the staff during the year in the United Kingdom. Inspectors are now located at London, Liverpool, Glasgow, Bristol and Manchester. Inspectors were employed at St. John, N. B., and Portland, Maine, during a part of the winter season.

Reports as to the condition of perishable cargoes loaded at Montreal, Quebec, Halifax, St. John, and Portland, Maine, and similar reports as to the condition of these cargoes as they are discharged at the ports in the United Kingdom are made by the inspectors, and filed in the office of the Dairy and Cold Storage Commissioner, where they are available for reference in case of complaints as to damage in transit or improper handling of cargo on the part of carriers. Shippers are promptly notified of any defect in packing, if goods are found to be out of condition, with suggestions for improvement as far as possible.

Recording thermometers, or thermographs, are placed on board ship with perishable food products whether carried as ordinary cargo or in cold storage chambers. The total number of thermograph records obtained during the past year was 537. Blue-print copies of all these records are sent to the Montreal Board of Trade, to the agents and chief engineer of the steamship companies concerned, to all shippers who request copies, to the Montreal office of the branch and to other branches of the department interested in particular products.

ICED BUTTER CAR SERVICE

The usual iced car service for butter, to pick up less than carload lots at stations along the stated routes, was in operation throughout the season on different lines of railways.

The number of cars employed in carrying butter to Montreal under this arrangement was 1,081, with a total tonnage of 21,134,041 pounds of butter. The number of cars in the Toronto service was 355 with a total of 6,493,458 pounds of butter carried. The average temperature of the cars as taken by the inspectors employed by the Dairy and Cold Storage Branch ranged from 48 to 54 degrees F.

In addition to the butter in refrigerator cars the inspectors examined the contents of 116 boxcars carrying butter, and found the temperature to average 60 degrees.

SESSIONAL PAPER No. 16

CREAMERY COLD STORAGE BONUS

There were forty applications received for creamery cold storage bonuses during the year, and one deferred from 1920. Of this number twenty-six were paid the full bonus of \$100, six were refused, and nine deferred for further action.

GRIMSBY COLD STORAGE

On December 31 last, the ownership of the Pre-cooling and Experimental Fruit Storage Warehouse at Grimsby, Ont., was transferred from the department to the Growers' Cold Storage and Ice Company, Limited, a company organized among the fruit growers. The value of the plant was fixed by arbitration.

The new company has greatly enlarged the warehouse, has increased the refrigerating capacity, and extended the scope of its operations by including ice making in its activities. Arrangements have been made to ice all cars loaded with fruit at Grimsby.

The operation of this warehouse by the department, through the Dairy and Cold Storage Branch, since 1914, has demonstrated to the satisfaction of the fruit growers and shippers in the vicinity that cold storage facilities are absolutely necessary if tender fruit crops are to be handled to the best advantage.

THE NEW PUBLIC COLD STORAGE WAREHOUSE AT MONTREAL

The cold storage warehouse erected by the Harbour Commissioners at Montreal will be ready for business by the first of May next.

SMALL COLD STORAGES

The Dairy Branch continues to receive many inquiries for plans and specifications for small refrigerators, suitable for the use of farmers, country stores, summer homes, and other places where ice is stored for domestic purposes.

A NEW SERVICE

A specialist in milk utilization was engaged during the year. The object of this service will be to disseminate information in various ways as to the valuable protective and nutritive qualities of milk and its products, and their relative cheapness as compared with other foodstuffs. We hope to secure results in this direction by the publication of suitable literature on the subject, through the medium of public addresses, moving pictures and playlets, by assisting in milk campaigns and child welfare work, and by putting on demonstrations or displays at meetings, exhibitions and other places as opportunity offers.

The new light which has been shed in recent years on the whole subject of human nutrition has placed dairy products in a very favourable position, and the public is entitled to have this information put before it by a fair and disinterested authority.

We consume in Canada fully 80 per cent of our total dairy production. We might very easily increase our consumption of milk and cheese and thus provide a good market for increased production. It is expected that something will be accomplished in this direction through the activities of this service.

HEALTH OF ANIMALS BRANCH

This branch administers two Acts of Parliament, the Animal Contagious Diseases Act and the Meat and Canned Foods Act; its activities, therefore, cover a wide range.

Under the former Act the work of the branch has recently been very greatly extended through its efforts to control and eradicate bovine tuberculosis. The two plans under which this work is chiefly conducted are known as the Accredited Herd Plan and the Municipal Tuberculosis Order.

The former plan deals with the pure-bred herds of the country and endeavours to eradicate tuberculosis entirely from this class of herd. The support given to this movement by the owners of pure-bred stock throughout Canada has been widespread and hearty. More work has been offered than the limited staff of the branch has been able to cope with, and, therefore, some delay has been inevitable in dealing with applications. The officers of the branch are, however, endeavouring to cope with this work as rapidly as possible and are making satisfactory progress.

In municipal testing, which offers facilities to any municipality in Canada which desires to eradicate tuberculosis from the herds supplying it with milk, marked progress has also been made. This plan has received increased attention and, judging from the large number of inquiries received from various cities and towns in Canada, work along this line may be expected to increase rapidly. It has already grown to large proportions, and wherever in operation has given satisfaction to the communities interested in it.

Several of the larger cities of Canada are now under the operation of the Municipal Tuberculosis Order, including Ottawa, Calgary, Edmonton and Regina, and smaller places, to a total number of fourteen. The demands made upon the staff of the branch for this work have, therefore, been very great, and it is to be regretted that the attendance at our veterinary colleges in Canada has of late years markedly decreased.

The veterinary profession does not appear to hold out to the young men of Canada the same attractions as other professions requiring a similar period of training. Unless the conditions change in the near future and young men are attracted into the veterinary profession, it may be expected that in a few years a great shortage of well trained veterinarians will be manifested. This can only be looked upon as a serious disaster to the live stock interests of Canada, which depend upon the well trained veterinarian for the maintenance of the health of Canadian live stock.

The past year has again demonstrated the freedom of Canada from serious diseases of live stock. Foot and mouth disease, cattle plague and contagious pleuropneumonia are still unknown within our borders, and the control of other diseases of a less serious nature has been maintained in a satisfactory way.

A brief glance at the conditions in regard to several of these diseases follows:—

GLANDERS

The provinces of Prince Edward Island and New Brunswick have been entirely free from this disease during the fiscal year just closed. Small outbreaks have been dealt with in all the other provinces, but the total number for the year is again considerably lower than that for the year ending March 31, 1921.

Reactions to the mallein test show that only twenty-five animals were affected with glanders, and these were slaughtered, and the compensation paid is considerably less than half the amount paid out during the previous year.

The policy of slaughtering all animals which react to the mallein test is thus vindicated again as being sound, and the only effective method of controlling this

SESSIONAL PAPER No. 16

disease, but the necessity for continual watchfulness remains, since immigrants and others are continually bringing in horses from across the boundary. These animals may quite possibly be in the incubative stage of the disease to an extent slight enough to avoid detection at boundary inspection ports, but sufficient to allow of the development of glanders some time after their arrival in this country, but, with the figures of the past few years as a guide, it is reasonable to expect that no widespread outbreak is liable to occur.

HOG CHOLERA

This disease has been dealt with in all provinces except Prince Edward Island and New Brunswick, but the year has shown a very remarkable reduction of the number of outbreaks, and the total number of animals affected.

For the year ending March 31, 1921, over 3,000 were necessarily slaughtered as being affected with hog cholera; during the year ending March 31, 1922, the number fell to less than 500. For the same periods compensation paid dropped from over \$20,000 to an amount slightly over \$3,000.

This improvement undoubtedly results from two causes. Of these, the first is the vigilance of our officers in maintaining a system of frequent and thorough inspection of premises upon which garbage is fed to hogs under license from the Veterinary Director General; the second cause is a concomitant of the first, in that owners and feeders of hogs are being educated to an appreciation of the necessity of meticulous precaution against the communication of disease to their animals through slovenly methods in care and feeding.

The policy of withholding compensation in cases where outbreaks have occurred upon garbage feeding premises has been continued.

A review of the incidence of the disease for the period under consideration is satisfactory, but it is probable that even better results will be obtained as opportunity offers to allow of more frequent inspection of licensed premises, and this is especially the case in the provinces of Manitoba and Ontario.

With the large increase of work in the direction of accredited herds, and municipal testing, the time available to our officers at the moment for routine inspections is materially curtailed.

TUBERCULOSIS

No work undertaken by the Health of Animals Branch is of any greater importance than that directed toward the control of bovine tuberculosis, and no part of the work is more difficult. The disease is so widespread, and so deeply rooted, that useful advance towards the goal of eradication must be steady and solidly based rather than rapid, but the support being accorded to the accredited herd plan, and the increased popularity of the municipal tuberculosis order, prove that stock owners and municipalities throughout the country are recognizing the practical nature of these policies.

On March 31, 1922, 909 herds were being dealt with by the department under the accredited herd plan; of these there were on that date 86 herds fully accredited, 724 herds in process of accreditation, and 99 herds accepted, but not yet tested. There were also 250 herds on the waiting list, and these figures give only a very moderate idea of the magnitude of the task, for in all herds accredited, or in course of accreditation, entry of additional cattle is only permitted under test, and retest after a lapse of sixty days in quarantine.

Under the municipal tuberculosis order, the work has increased very considerably during the past year. The herds supplying milk to fourteen towns and cities were submitted to 31,733 tests and 1,729 reactors were removed and slaughtered. It is interesting to compare these figures with those of the previous year, when 5,189 tests were conducted, and 238 reactors slaughtered.

13 GEORGE V, A. 1923

In connection with this disease our inspectors also test cattle for export, but they are relieved of a certain amount of this work by the arrangement under which the United States Bureau of Animal Industry accepts tuberculin test charts of authorized veterinary inspectors when these charts are endorsed by an officer of this Department. If exporters will avail themselves of the services of these veterinarians as much as possible, they will find that their wishes as regards testing can be more promptly attended to, and our officials will have more time to attend to the testing of herds under the accredited herd plan.

MANGE

The blanket quarantine, which for a period of twenty-six years covered large portions of the provinces of Saskatchewan and Alberta, was removed during the year ending March 31, 1921, and since that time no necessity for the resumption of such quarantine has arisen.

A certain number of cases in which cattle mange was suspected were examined, and treated under the supervision of our officers, but action of this nature was largely precautionary. Actual cases of mange have been few, and have been controlled by quarantine, and treatment of individual herds. All reports of suspected mange have been immediately and closely followed up, and investigated, and the co-operation of owners is now much more easily secured, so that the inconvenience necessary under the area quarantine system of quarantining clean herds, as well as those actually infected, has been removed.

Control of this disease has now reached a point at which complete success may be reasonably expected. Farming is gradually replacing ranching in Western Canada, and the consequent subdivision both of the open ranges, and of the herds which formerly populated them, tends to render the work of inspection and treatment less onerous than formerly, but the co-operation of stock owners is still a factor vital to success.

Such co-operation is most simply and effectively given by the reporting of suspected cases immediately suspicion is aroused, and so affording our inspectors an opportunity for instituting measures of control at the earliest possible moment. If such co-operation be rendered, there is no reason to suppose that the system of blanket quarantine, and the inconvenience and annoyance inseparable from it, will ever again become necessary.

DOURINE

During the year ending March 31, 1921, a few suspected cases of this disease were treated by the laboratory, blood tests of which resulted in a negative reaction. This year no suspects were found in spite of the fact that a very careful watch was maintained in those districts previously affected with the disease.

As recently as the year 1915, a sum of \$32,000 was paid out in compensation to owners of animals slaughtered for dourine. The value of the work of the inspectors engaged in the task of eradication can be gauged to this extent, but it is impossible to estimate the saving effected to the benefit of the horse owners of the western provinces, and so through them to agricultural interests generally throughout Canada.

Since the disease is insidious in its advance, and impossible of control, unless a radical and painstaking system of attack be put in force against it, no feeling of security will be allowed to diminish the vigilance of the officers of the department, but the results of the past two years afford solid ground for the belief that the disease has been eradicated from the Dominion.

ANTHRAX

One or two suspected outbreaks have been dealt with as a precautionary measure, but the actual existence of the disease has not been definitely established.

SESSIONAL PAPER No. 16

SHEEP SCAB

Only suspected cases have been dealt with during this period; of these one was in Saskatchewan, and one in Manitoba. Other provinces have been entirely free, and not even suspected outbreaks have occurred.

RABIES

No outbreaks of this disease have occurred during the year ending March 31, 1922. Suspicious symptoms occurring in one province were investigated, but laboratory investigation failed to confirm the existence of the disease.

INSPECTION OF STOCK CARS AND YARDS

The work of supervising the disinfection of stock cars and stock yards throughout the Dominion for the purpose of insuring that these are maintained in sanitary condition has been continued by the inspectors especially appointed to this work.

QUARANTINE STATIONS AND INSPECTION PORTS

On the Atlantic and Pacific coasts, and on the international boundary, quarantine stations and inspection ports have been maintained; animals entering Canada are examined at these points, and much of our freedom from disease among animals depends upon the thoroughness with which this work is accomplished.

It has again become necessary to refuse entry to cattle, sheep, other ruminants and swine, from Great Britain and Ireland, owing to outbreaks of foot and mouth disease in Great Britain. Such restrictions react unfavourably on Canada, as our breeders are prevented from obtaining purebred stock by importation. It is hoped that the necessity for any regulation of this kind will be removed in the near future.

PATHOLOGICAL DIVISION.

This division has been set a very severe and difficult task. The demands for laboratory services and special investigations have increased by leaps and bounds. The laboratory work required in the administration of the Animal Contagious Diseases Act and the Meat and Canned Foods Act grows continually; in addition, applications for vaccines and sera, requests for laboratory tests, examinations and reports, and appeals for advice, assistance and investigation pour in from stock owners and veterinarians from all parts of the country.

This Dominion-wide work requires men specially trained in bacteriology, serology, pathology and parasitology. Eight men are available for the six laboratories and research stations maintained; the chief of the division and three animal pathologists for the Biological Laboratory, Ottawa, and the Research Station, Hull; and one animal pathologist for each of the following: the Veterinary Research Station, Lethbridge, Alberta, the Veterinary Research Station, Agassiz, B.C., the Fox Research Station, Charlottetown, P.E.I., and the Laboratory connected with the Poultry Division, Central Experimental Farm, Ottawa.

BIOLOGICAL LABORATORY AND RESEARCH STATION

Bovine Tuberculosis.—Bovine Tuberculosis and the development and extension of the Accredited Herd plan has occasioned extraordinary efforts on the part of every member of the staff. The success of this campaign depends not only upon the zeal and laborious work of inspectors in the field but to a large extent upon the work of the Pathological Division, upon the results of research work, the examinations and reports upon the material obtained from reacting cattle and upon the reliability and potency of the tuberculin used in testing the herd. A small herd of cattle are maintained at the Research Station for experimental work in connection with the

13 GEORGE V, A. 1923

testing and standardizing of manufactured tuberculins and with the problems relating to acquired resistance, tolerance and immunity of cattle to tuberculin and tuberculous infection.

The immense importance of tuberculosis eradication in cattle and the immense sums of money that must be spent in attempting it, warrant extensive research work. Better knowledge of several important factors in tuberculosis infection of cattle, which at present are baffling or inexplicable, would surely lead to more perfect methods of control and to reducing the cost of this expensive campaign. In spite of the lack of present facilities for research some observations and experiments made during the past year are important and significant and it is hoped that means will soon be provided for the continuation of uninterrupted research on this great problem.

The tuberculin test offers the best known means of detecting hidden infection. Studies are being made of the conditions under which this test sometimes fails, of serum and immunity reactions and of auxiliary tests, which, in the future will probably play a role of great importance.

The laboratory output of tuberculin for the year ending March 31, 1922, was 300,745 doses, that is, three times the amount for the previous year 1921, six times the amount for the year 1920, and nearly thirteen times the amount for the year 1919. These figures alone indicate how the work of this division has increased during the past four years.

Contagious Abortion is also causing year by year an increased demand for laboratory products and special investigation. The demand for the former has been met but neither the staff nor accommodation has permitted serious investigational work to be undertaken. We continue to furnish abortion vaccine for the treatment of severely infected herds. The owners are requested to keep a detailed herd-history record and for this purpose blank sheets are issued with each consignment of vaccine on which all the information required before and after treatment is specifically indicated. We hope by this means to obtain some valuable data. The vaccine preventive treatment for abortion is admittedly in the experimental stage and nothing definite can be said with regard to the efficacy of the treatment, which is favoured by some authorities and opposed by others.

Blackleg Vaccine.—The demand for this vaccine has been met and over 33,000 doses have been issued. However, there are a number of different forms of blackleg vaccine on the market which seem to be increasing in popularity each year. It is not our intention to compete with commercial houses in the manufacture and sale of a product of known efficiency. The question of discontinuing the preparation and distribution of blackleg vaccine is now under consideration.

Specimens and Samples.—Over 800 specimens and samples, including blood and body tissues of animals, suspected animal feeds, meat and canned foods, samples of water, parasitic infestations, etc., have been examined and reported upon. Some of the above have led to extensive field investigations and laboratory research.

DISEASES OTHER THAN THOSE DEALT WITH UNDER THE ANIMAL CONTAGIOUS DISEASES ACT

In addition to contagious abortion of cattle, which is not dealt with by the Act, the Pathological Division performs a great deal of work on other diseases and conditions, some of which are assuming great economic importance. A monthly return of diseases and conditions affecting livestock is collected from the Chief Inspector of each province.

Botulism is another disease, or rather a form of Forage Poisoning, which is causing considerable losses to stock. The first proof of this condition in Canada has been established during the past year by the investigations carried out at this laboratory. A paper on the subject is now in the press and further studies are in progress.

SESSIONAL PAPER No. 16

Bovine Mycosis.—From time to time conditions somewhat resembling those of a serious disease are reported and necessitate immediate investigation. These generally prove to be a form of mycosis. As this condition may be confused with foot-and-mouth disease, a special study of it is under way and a preliminary report ready for publication.

Many other problems of the live stock owner are dealt with by this division either by direct communication with the owners or through the attending veterinary practitioner.

BRANCH LABORATORIES AND STATIONS

Veterinary Research Station, Lethbridge, Alta.—The principal diseases under investigation are swamp fever of horses, parasitic mange of cattle and necrobacillosis of sheep. Although the disease known as dourine, so fatal to horse-raising, appears to have been completely eradicated as a result of the thousands of tests made in previous years at this laboratory, occasional tests are made of stallions for the safeguarding of the horse-breeding industry.

Veterinary Research Station, Agassiz, B.C.—Certain diseases of sheep and goats and the disease known as Kamloops cattle disease have received attention. Laboratory experiments have been conducted in connection with contagious abortion of cattle. Considerable correspondence has been attended to, while lectures and addresses are given at live stock meetings on the problems peculiar to British Columbia.

Fox Research Station, Charlottetown, P.E.I.—The various problems and phases relating to fox farming, more particularly sanitation, diseases and parasitical infestations, have been studied, and much progress made. A number of papers have been published and have been summarized or rewritten in a paper which is now ready for publication as a special bulletin.

POULTRY INVESTIGATIONS

This work is carried on at the laboratory connected with the Poultry Division, Central Experimental Farm. The chief problems studied are those of roup and canker, those of incubation and the fertility of eggs, and the parasites of poultry.

At each of the above-mentioned branch laboratories a considerable amount of routine work has to be attended to in reporting upon specimens received, animal autopsies, and in answering letters of inquiry.

MEAT AND CANNED FOODS DIVISION

The volume of work carried on by this division has increased to a great extent during the past year.

Rapid strides have been made in systematizing the work throughout the whole country with a view of having uniformity made general.

A high standard of efficiency has been maintained in the large force engaged, in order that the service may be of incalculable value to the country at large. It stands to-day as one of the most fully equipped agencies through which may be gathered the data necessary to the success of any broad plan, having for its object the conservation of the national food supply.

Through the system of meat inspection alone, it reveals diseases such as tuberculosis, etc., parasitic affections, the presence of which is not suspected in the living animal until the damage is beyond remedy and the loss beyond prevention. With the knowledge gained in this manner, the work of eradicating diseases would be considerably impeded.

Every effort expended toward this eradication is a material advance along the line of conserving the food supply as well as preservation of the public health by preventing food of an unwholesome nature being offered for sale.

The principal disease observed is tuberculosis, which according to post mortem finding has from year to year increased. What might have been the result had the meat so affected been consumed, we can only imagine.

The plans at present being carried out toward its eradication give promise to a gradual process of elimination in the not distant future. Valuable assistance is being rendered those entrusted with this all-important work of eradication by statistics furnished as to the centres of infection, by those engaged in post mortem inspection in the large packing houses, wherein complete records are kept regarding the districts from where the infected animals originated.

During the fiscal year ending March 31, the number of establishments in Canada operating under the control of this division were:—

Meat packing..	43
Jam, pickle and canning establishments..	313
Apple evaporators..	159
Condensed and evaporated milk plants..	31

The above establishments, by provinces, were distributed in the following manner:—

	Meat packing	Jam, pickle and canning estab- lish- ments	Apple evapor- ators	Condensed and evaporated milk plants
Prince Edward Island	3	6		1
Nova Scotia		18	17	1
New Brunswick		8	1	
Quebec	9	47		1
Ontario	15	189	137	24
Manitoba	8	6		
Saskatchewan	1			
Alberta	6	2		
British Columbia	1	37	4	4

In the Meat Packing Establishments the total number of animals inspected at the time of slaughter were 3,119,326.

This number was divided as follows:—

Cattle, 737,223; sheep, 654,806; swine, 1,727,297.

The number of carcasses which passed inspection was:—

Cattle, 728,147; sheep, 654,188; swine, 1,723,426.

In addition, the following animals were condemned on post-mortem inspection:—

Cattle, 9,076; sheep, 618; swine, 3,871.

On inspection and reinspection of the meat food products prepared and processed in the establishments, a large amount was condemned on account of conditions such as rancidity, taint, etc., etc., which rendered it unwholesome for human consumption.

Owing to the great care exercised by our officers and the reasonable manner in which the difficulties have been met and adjusted, grievances between manufacturers and officers of this division have been reduced to a minimum, which is most gratifying, to say the least. There are, however, questions of policy occasionally arising, the settlement of which can only be affected through changes in the law itself or its interpretation.

SESSIONAL PAPER No. 16

At the present time those operating under the Act, particularly the meat packing establishments, with some justification feel that in so far as intra provincial business is concerned, they are subjected to the competition of diseased and unsound meats and meat food products placed on the market by those whose establishments are not under official supervision. It is pleasing to note, nevertheless, that there exists to-day a great sentiment in favour of the establishment of municipal abattoirs wherein meats intended for domestic consumption shall be subject to the same expert examination as those dealt with under The Meat and Canned Foods Act.

It is earnestly hoped that public opinion now being formed along the line of demanding only inspected food products will, in the not distant future, assume such proportions as will forcibly impress upon the municipal and provincial authorities the importance of this great work, which it is felt, will be a step in the right direction and also assist materially in protecting our greatest national resource, namely, public health.

The officers of this division rendered invaluable service to several of the farming organizations throughout the country along the line of greater live stock production by placing before them the various disease conditions found in food producing animals which were revealed during the inspection work carried on in the large packing establishments throughout the country.

It is hoped that the information imparted relative to the general conditions found may act as a stimulus to live stock producers whereby every effort shall be put forth in order to free their herds from the ravages of disease.

An honest effort put forward in this regard will be conducive to the conserving of one of Canada's greatest assets, namely, food producing live stock.

In the other establishments where food products are manufactured, the work carried on by our officers has been of paramount importance. Sanitary conditions are improving steadily. The quality of the product has been very considerably enhanced by the setting up of standards covering Canadian fruits and vegetables and the strict enforcement of the law governing same, which renders it imperative that the label shall embody the "truth, the whole truth and nothing but the truth", thus insuring the consumer of a sound, wholesome food supply, and which from an economic point of view places our exportable food products on an enviable plane on the various foreign markets.

The standardizing of these products forming, as it did, a nucleus for the general standardization of food products, has had a marked effect on foreign buying as manifested by the increased demand for Canadian canned fruits and vegetables.

The consumption of canned food products put up under inspection is steadily increasing. Seldom, if ever, do we learn of cases where illness due to ptomaine poisoning can be directly traced to the eating of same. This, it is felt, is due chiefly to the following:—

First. Nothing but sound, wholesome material enter into their composition.

Second. The strict sanitary measures adopted in connection with the packing of same.

Third. The elimination by law of injurious preservatives and the very complete scientific manner in which the various products are prepared and handled prior to and during the course of preparation.

The jam manufacturing industry has been receiving careful study. A large amount of useful information has been accumulated from research work carried on and it is hoped that the not distant future will witness the formulating of equitable legislation covering the standardization of jams, marmalades, etc., which will lead to the stabilizing on both the home and foreign markets products of this great present-day industry.

13 GEORGE V, A. 1923

A great amount of experimental work has been carried out during the year, in connection with the work of inspection in general. A mass of valuable data has been accumulated, which will serve to assist materially those responsible for the enforcing of the different laws pertaining to foods.

EVAPORATED APPLES

Rapid strides have been made during the past year along the line of stabilizing this important industry, the aim of those interested, being the preservation of this form of food, through most improved and up-to-date methods.

The legal standards of quality governing this product, which have been in effect but a comparatively short time, have been productive of most beneficial results and have been conducive to increasing materially the demand for this food commodity by foreign countries.

The manufacturers and dealers have given wholehearted support in assisting our officers in enforcing the standards, with the result that to-day the industry bids fair to become a very important factor in the economic life of Canada.

There are, however, at the present time, a few factories that are not up to the standard with regard to equipment, etc., they being, so to speak, rather antiquated. Yet a gradual process of elimination in regard to these establishments is being carried on by our responsible officers and the time is not far distant when it is hoped that this product will emanate from none other than establishments most modern in every respect.

CONDENSED AND EVAPORATED MILK

During the past year, a marked increase has been shown in the export demand for the products manufactured in these establishments. The preceding year was to say the least a most unfavourable one, post-war conditions apparently affecting it seriously.

The high quality of the product which is manufactured under strict sanitary requirements, coupled with the ever increasing demand for it, are features which spell success for the future of this industry.

The work of inspection of imports of food products has been greatly improved. At the present time, our officers stationed at important points throughout the country from Charlottetown to Victoria, manifest strict vigilance over all imports in order that nothing may be allowed into the country that does not conform in every way with the requirements of the law governing same.

During the past year, this organization was placed at the disposal of the Department of Marine and Fisheries in order that a closer check might be made of the imports of canned fish products.

It is pleasing to note that satisfactory arrangements were made whereby this important phase of the public food supply has been receiving the desired attention.

A section of the Feeding Stuffs Act relative to animal products manufactured in establishments under inspection has also been enforced by officers of this division stationed throughout the various establishments. The arrangement has been to all intents and purposes extremely satisfactory as no additional cost has been incurred in enforcing the above mentioned Act.

LIVE STOCK BRANCH

HORSE DIVISION

During the year officers of the division continued enquiry into the conditions of the horse industry both on the farms and in the cities. The information secured goes to corroborate that previously obtained. Even in cities where climatic conditions are most favourable for open traffic during the winter months, horse-power is for certain work replacing mechanical power. The horse is slowly but none the less surely returning to favour and from the evidence at hand will continue to do so in proportion as the country returns to normal conditions.

The cold and heavy snow falls of our northern winters, preceded and followed as they are by a period of rain and soft roads, are great determining factors in favour of the horse, always efficient under such conditions; this statement is substantiated in the opinion of men who have been long engaged in transportation work in various parts of Canada ranging from the Atlantic to the Pacific ocean. These men are quite emphatic in the statement that horse-power in this northern country will never be seriously replaced by mechanical power, and are further urgent in the demand that a horse-breeding propaganda be carried out; otherwise there will be a great shortage of certain classes of horses, particularly needed in this reconstruction period in our young country.

The lowered cost of farm products is also compelling farmers to adopt the most economical methods in carrying on their work. By keeping a number of good brood mares to do the farm work, a crop of colts can be raised each year which will prove a valuable asset. In addition, the manure produced by the horses will not only add fertility to the soil by supplying it with otherwise costly fertilizing ingredients but will also add humus which the wise farmer knows is absolutely essential if he wishes his land to produce good crops. Furthermore, horses through their adaptability can be used on any farm whether the soil be rough and hilly, stony or stumpy, or laid out in small fields or mile stretches. In a bad season the farmer can start cultivating and seeding with horses with a minimum amount of delay and there will not be strips of the land packed so hard that they cannot grow a crop.

There is another phase of the question that should not be overlooked, in fact, it should be given serious attention not only by the farmers but by transportation people of the whole country. It is the fact that, in producing horses the feed is grown on the farms and thus obtained at first cost. In that way, a wider market is created for coarse feeds and the money kept in the country. Where mechanical transportation power is used, large quantities of gasoline and oil are required, much of which has to be imported and accordingly large sums of money leave the country. If all the gas and oil required were obtained in Canada, the farmer would still be at a disadvantage in using motor power in that he would have to buy it as a finished product and at retail price. On the other hand he may obtain feed for his horses at first cost and at the same time return a very considerable amount of fertility to the soil, in the shape of manure.

After careful study of the question, the department decided that in the best interests of the country a few of the facts regarding the horse should be placed before the breeders. Accordingly, this was accomplished through the medium of a few advertisements appearing in the agricultural press. These advertisements pointed out clearly that unless more attention is paid to breeding there will be a decided shortage of big draught horses in the course of the next three or four years. The advertisements also set forth the need for horses weighing from 1,000 to 1,400 pounds and sired by suitable stallions of the so-called light-horse breeds. From such matings, saddlers and hunters, for which there is a keen demand at good prices, are obtained,

13 GEORGE V, A. 1923

and as well as police and remount horses, fire horses, delivery horses and useful farm horses. If the breeders of the country will follow the policy indicated they will adhere to certain definite types and thus eliminate the nondescript, for which there is no demand.

CLUBS

In 1921 there was a very material increase in the number of Breeding Clubs in the province of Quebec. The average of the stallions hired was very good indeed, in fact, better than in some of the other provinces. A gratifying result brought about by community breeding is that clubs are selecting a better class of stallion. Last spring many private individuals purchased high-priced sires of outstanding merit because they were able to hire them to clubs and were thus assured of a fair return on the money invested.

In those provinces where community breeding has been given attention, there is to-day a nice crop of young horses coming forward, and year by year improvement is being made through the selection not only of better stallions but also of better mares. To this might be added better feeding, care and management which practices ensure the colts growing to normal size. The holding of Colt Shows in many of the districts is also doing much to encourage the breeding of a better class of horse, demonstrating to the people how to feed and care for the colts properly, and at the same time instilling a love for good animals into the breeders, and particularly into the boys who are later on to represent the farming industry.

Community breeding or the raising of a large number of horses of a certain type in one district is beneficial in that when a district once becomes known for producing a certain type, the matter of selling will be facilitated. Buyers are always attracted to centres where carloads can be readily picked up; thus, in addition to finding a market for the surplus stock there is bound to be competition so that the best prices possible will be obtained.

CATTLE DIVISION

DISTRIBUTION OF PURE-BRED BULLS

Pure-bred bulls have been loaned by the branch since 1913 to specially organized associations in newly settled districts and in backward sections of the older provinces. Up to the end of the calendar year 1921, the number of bulls loaned in this way totalled 3,424.

This policy is now well known throughout the whole Dominion and is popular not only with farmers who are able under its terms to secure the services of a good bull, but also with breeders who are anxious to find a steady outlet in their own country for commercial bulls.

In many districts in which the department's bulls have been standing for service for several seasons, improvement in the young stock and in the stock annually marketed is to-day very noticeable. It is not the policy of the branch to continue assistance to a district after the farmers in same are in a position to purchase their own sires and no bulls are discarded until their usefulness as sure and suitable sires is over.

During the past two years, the branch has been securing a large proportion of its supply of bulls from the various provincial consignment sales and this support has been highly appreciated by contributors to the sales since it has assured them a good average price for the better bulls offered and has provided an inducement to bring out to these sales only a desirable class of commercial bulls.

The following table gives the total number of bulls purchased for each province under the Distribution Policy during each year of its operation to the end of 1921 and also the total cost of each year's purchases:—

SIRE PURCHASE POLICY

In the spring of 1921, the branch inaugurated the above policy with a view to encouraging a more general use of properly selected animals and of providing an agency through which farmers may secure good pure-bred sires with the least possible expense and difficulty.

Under this policy the branch is prepared to fill orders for bulls, boars, and rams under certain conditions. An applicant is required to deposit a percentage of the purchase price with his order. The sire, when secured, is shipped to him on approval. If no complaint regarding the animal is made within three days after delivery, the balance of the purchase price becomes due.

This policy has been operative in several provinces during the past year and a considerable number of bulls have been purchased under its terms for settlers and other farmers who were not in touch with breeders and who were so situated that they could not set out to purchase a sire for themselves without running up a travelling expense bill out of proportion to the amount of the investment involved.

The purchases made have given good satisfaction and during the spring months of 1922 many farmers, particularly in Western Canada, have taken advantage of the assistance given under this policy in securing pure-bred bulls for their own use.

SCRUB BULL CAMPAIGN IN ONTARIO

During the year 1921, the Live Stock Branch co-operated with the Ontario department in promoting an anti-scrub bull campaign in several counties of western Ontario.

An effort was made by the provincial department to eradicate scrub bulls completely from a number of townships in the counties of Huron and Bruce and during the first six months of the year, upwards of seventy pure bred sires were placed in that part of the province as a direct result of the campaign.

In order to facilitate the sale of these bulls, the Live Stock Branch opened exchange stables at several points and kept a supply of bulls on hand in these stables during the weeks that the campaign was in progress in the territory adjacent to the various points at which the stables were opened. These bulls were purchased outright from the breeders and were sold at cost plus freight and feeding expenses. The bulls were all carefully selected and the expense of purchasing and caring for them while they were in the stables was borne by the branch. One of the field officers of the branch also assisted in working up a demand for the bulls and took complete charge of the closing of all transactions where bulls were sold through the exchange stables. In all, fifty-four bulls were sold through these stables. During the months of October and November, one of the field officers of the branch was of very material assistance in the county of Oxford in effecting an exchange of young pure-bred bulls for grade bulls in the county. Under the policy followed by the district representative in that county, a number of the local breeders donated a young sire for this purpose and the proceeds received from the sale of the scrub bulls which the pure-breds replaced were divided among the contributors. This policy was effective in the replacing of upwards of sixty scrub bulls within the boundaries of Oxford County.

During the early part of 1922, the campaign was extended to cover a number of counties not touched in 1921, notably Peel, Dundas, Renfrew, Perth and Ontario. Exchange stables were opened by the branch at different points in which pure-bred bulls were assembled for resale. In addition to the assistance given in purchasing bulls for these stables and in supervising their maintenance in the stables and their resale to farmers, field men of the Cattle Division devoted considerable time to preliminary organization work.

SESSIONAL PAPER No. 16

CAR-LOT POLICY

This policy provides for payment by the Live Stock Branch of reasonable travelling expenses of farmers residing in Canada who purchase stock at general stock yards for return to country points. In Eastern Canada the assistance rendered is confined to purchases of female breeding stock, cattle, sheep or hogs. In Western Canada the policy covers stocker and feeder cattle in addition to breeding stock. Purchasers are required to fulfil certain requirements of the department in connection with their shipments and to give satisfactory assurance that none of the stock is being purchased for speculative purposes.

This policy has proved a very valuable educational agency in that its terms have encouraged farmers from all over the country to visit the stock yards and to become acquainted with methods of doing business at these points, and has unquestionably played a very important part in encouraging a return of unfinished cattle and sheep to country points for further feeding and also in the return of young female breeding stock, particularly from yards in Western Canada.

The policy has been in effect on the stock yards of Western Canada since the fall of 1916. On the yards at Toronto and Montreal it has been effective only since May 1, 1918. The following is a statement of the shipments made under its terms for the five calendar years ending December 31, 1921:—

CAR-LOT POLICY SHIPMENTS

Year	Steers	Heifers	Sheep
1917.....	10,773	9,083	1,430
1918.....	20,632	18,702	6,266
1919.....	22,490	17,550	9,408
1920.....	14,012	7,992	6,137
1921.....	8,714	7,626	9,417
Totals	76,621	61,553	32,658

The cost of this policy to the department during the above five year period averaged 60 cents per head for cattle and 17 cents per head for sheep.

FREE FREIGHT POLICY

In the fall of 1917, the free freight policy was inaugurated by the Live Stock Branch in co-operation with the railway companies of Canada, with a view to preventing, as far as possible, the slaughter or exportation of useful heifers, young ewes and young sows offered for sale on the open market at the central stock yards. Under this policy farmers are entitled to ship from stock yards to country points female breeding stock, of the classes mentioned, without payment of freight charges on same, provided the stock was not purchased for speculative purposes.

During the time the policy has been in operation it has been very widely taken advantage of by farmers anxious to secure breeding stock and it has unquestionably been one of the most important factors in promoting the return to country points of a large percentage of useful females offered on the yards, particularly at Edmonton, Calgary and Winnipeg. Since the inception of the policy, September 21, 1917, shipments under its terms from the different yards up to December 31, 1921, numbered as follows:—

13 GEORGE V, A. 1923

Name of Yard	Heifers	Ewes	Sows
Calgary	27,819	41,747	..
Edmonton	25,129	9,671	155
Winnipeg	21,599	10,855	243
Toronto	1,974	12,367	....
Montreal	420	190	...
Montreal	184	452	...
Prince Albert.....	71	100	...
	77,156	75,442	358

BOYS' CATTLE BREEDING CLUB POLICY

In January, 1922, a new policy, known as the Boys' Breeding Club Policy, was inaugurated, the objects of which have been outlined as follows:—

(1) By stimulating and promoting interest on the part of farm boys in breeding, feeding and marketing of good cattle.

(2) By encouraging a closer study of production and marketing costs with a view to eliminating wasteful and unproductive methods and to realizing the highest net returns from the product marketed.

(3) By demonstrating the importance of maintaining a proper balance between individuality and productive capacity in appraising breeding stock.

(4) By increasing the commercial value of the cattle of the country through wider distribution of good breeding stock.

(5) By increasing the value of the cattle of the country through the principle of community breeding.

(6) By providing a means of demonstrating the importance of proper feeding and management in developing and thereby increasing the value of young breeding stock.

Under this policy, boys' clubs of fifteen members or more are being started with pure-bred heifers. They are required to finance these heifers themselves, to keep careful record of the season's operations both as regards the heifer herself and as regards the progeny. Competitive features will provide incentive and interest and by linking up the work with the Distribution Policy and with the Record of Performance, provision will be made for continuous constructive work from season to season.

Several clubs have been started under this policy in Ontario and the Maritime Provinces and it is expected that a considerable number will be organized during the fall months.

RECORD OF PERFORMANCE TEST FOR PURE-BRED DAIRY CATTLE

During the past year there has been a greater increase than in any previous year, both in the number of cows entered in the test and the number of owners who have commenced the work. During the year, two thousand nine hundred and eighty-six applications for entry were accepted. At the present time there are six hundred and forty farms where cows are being tested for the Record of Performance. The work has increased to a point where it has become necessary to apply for the appointment of additional inspectors in order that the requisite number of visits may be made to each farm where cows are being tested.

The Record of Performance now commands the confidence of breeders of dairy cattle throughout the whole Dominion and is proving of inestimable value to the dairy industry, as well as to individual farmers who are anxious to improve the production of their herds by introducing superior blood lines.

SESSIONAL PAPER No. 16

It has, however, recently become necessary to draw attention to the fact that the object of the Record of Performance is not to provide a free and open competition for high individual records. In many instances, breeders have taken advantage of the test merely to enter one or two particularly good cows, with a view to qualifying them with outstanding records. The practice has not only added greatly to the department's cost in supervising the test, but has also indicated a lack of general recognition of the importance to the industry of high average herd production. The amending of the rules of entry with a view to stressing the real purpose of the test is now under consideration.

Following is a brief summary of the year's work:—

NUMBER OF COWS ENTERED FOR THE TEST

Ayrshire.. . . .	875
French Canadian.. . . .	53
Guernsey.. . . .	82
Holstein Friesian.. . . .	1,015
Jersey.. . . .	673
Red Polled.. . . .	27
Shorthorn.. . . .	261
	<hr/> 2,986 <hr/>

NUMBER OF RECORD OF PERFORMANCE CERTIFICATES ISSUED

	Cows	Bulls
Ayrshire.. . . .	350	11
French Canadian.. . . .	10	1
Guernsey.. . . .	26	1
Holstein Friesian.. . . .	591	27
Jersey.. . . .	251	9
Red Polled.. . . .	3	..
Shorthorn.. . . .	137	2
	<hr/> 1,368 <hr/>	<hr/> 51 <hr/>

TOTAL NUMBER OF CERTIFICATES ISSUED SINCE THE COMMENCEMENT OF THE RECORD OF PERFORMANCE

	Cows	Bulls
Ayrshire.. . . .	2,193	96
French Canadian.. . . .	112	3
Guernsey.. . . .	81	2
Holstein Friesian.. . . .	2,693	123
Jersey.. . . .	826	30
Red Polled.. . . .	3	..
Shorthorn.. . . .	520	11
	<hr/> 6,428 <hr/>	<hr/> 265 <hr/>

POULTRY DIVISION

During the past year the poultry industry in Canada has had one of the most successful years in the history of the industry. Prices have been well maintained both in relation to prices prevailing during the after-war period and in contrast to prices of other agricultural products. At the same time, during the latter part of the year, costs of production were materially reduced, with the result that those who were successful in securing good production of eggs during the late fall and early winter obtained highly satisfactory and remunerative returns.

It has been apparent for some time that the National Poultry Policy outlined a few years ago, and which was included in the last report, has contributed in no small degree to the satisfactory condition of the industry. This condition is strongly apparent in the place which Canadian eggs have found on the British market, the

free movement of the Canadian storage eggs for export last fall having done much to clear the market and maintain the price. Possibly one cannot better sum up the situation in an export way than to quote from a letter received from a well-known Canadian editorial writer for a prominent western paper who, following interviews with many British importers, writes that the dealers there speak most highly of the work which Canada has done in the way of egg trade improvement and that it is a very great satisfaction to know that Canada has succeeded in making her egg trade respected.

EGG INSPECTION

By virtue of authority granted under the Egg Regulations under the "Live Stock and Live Stock Products Act," it is required that Canadian eggs for export be graded and inspected as to grade before being shipped. The Egg Regulations have been in effect for the past four years and it is due in no small degree to the uniformity and high average quality which has been secured under this system that Canadian eggs have obtained such favourable recognition on the British market.

For the purposes of administration, Canada is divided into two sections, viz., Eastern and Western. The Eastern Section covers Ontario east of Port Arthur, Quebec and the Maritime Provinces. The Western Section covers territory west of the Great Lakes, including Port Arthur. The following table gives a record of inspections for the calendar year 1921:—

TABLE 1.—STATEMENT OF INSPECTIONS, EASTERN SECTION

Months	Number of inspections	Number of inspections approved	Number approved to date	Number of cases inspected	Number of cases inspected to date
January.....	2	2	2	500	500
February.....	3	3	5	500	1,000
March.....	3	3	8	1,134	2,134
April.....	57	56	64	24,632	26,766
May.....	66	64	128	24,227	50,993
June.....	62	59	187	17,883	68,876
July.....	34	30	217	7,284	76,160
August.....	53	51	268	17,725	93,885
September.....	49	46	314	14,210	108,095
October.....	171	161	475	60,666	168,761
November.....	143	139	614	52,530	221,291
December.....	31	29	643	7,632	228,923

TABLE 2.—STATEMENT OF INSPECTIONS, WESTERN SECTION

Months	Number of inspections	Number of inspections approved	Number approved to date	Number of cases inspected	Number of cases inspected to date
January.....	11	10	10	3,859	3,859
February.....			10		3,859
March.....	12	11	21	5,211	9,070
April.....	33	33	54	12,937	22,007
May.....	61	57	111	20,553	42,560
June.....	63	54	165	18,681	61,242
July.....	28	25	190	8,401	69,642
August.....	50	41	231	10,029	79,671
September.....	18	16	247	3,767	83,438
October.....	19	19	266	4,321	87,759
November.....	20	19	285	4,828	92,587
December.....	9	5	290	1,189	93,776

TABLE 3.—STATEMENT OF INSPECTIONS, EASTERN AND WESTERN
SECTIONS COMBINED

Months	Number of inspections	Number of inspections approved	Number approved to date	Number of cases inspected	Number of cases inspected to date
January.....	13	12	12	4,359	4,359
February.....	4	3	15	564	4,859
March.....	15	14	29	11,201	11,201
April.....	61	59	118	48,773	48,773
May.....	127	121	239	96,565	96,565
June.....	125	113	352	130,117	130,117
July.....	62	55	407	145,802	145,802
August.....	103	92	499	173,556	173,556
September.....	67	62	561	191,533	191,533
October.....	100	100	741	286,540	286,540
November.....	163	158	899	313,878	313,878
December.....	40	34	933	322,699	322,699

TABLE 4.—SUMMARY OF INSPECTIONS, WESTERN SECTION
(PRAIRIE PROVINCES)

	1920 Jan. 1st. December 31 inclusive	1921 Jan. 1st. December 31 inclusive
Number of men inspected	342	224
Number shipped to Mexico	72	100
Number shipped to Cuba	0	2
Number shipped to Toronto	53	21
Other Canadian ports	25	12
Number shipped to British Columbia	11	11
Number exported direct	55	40
Number moved interprovincially to other Provinces	16	103
Number not approved	47	35

TABLE 5.—EXPORTS (BY GRADE), 1921 (AS INSPECTED)

	Fresh			Storage			
	Extras	Firsts	Seconds	Extras	Firsts	Seconds	Preserved
January					360	140	
February	450	50					
March							
April							
May		1,789					
June	110	2,275					
July	2,015	2,550					
August	1,670	1,220	100				
September	2,350	3,370		1,000	4,270		225 firsts
October	2,551	280	620	9,258	44,447	517	1,031 extras
November	322			5,960	41,787		700 firsts
December					2,500		349 firsts
Total	9,501	22,334	720	16,218	93,364	1,463	125 extras

Total fresh.....	32,555 cases
Total storage.....	113,678 "

Total	146	200
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13 GEORGE V, A. 1923

For the calendar year, 1921, 998 inspections were made covering 322,969 cases; of these 146,233 cases were exported to Great Britain and of this quantity 32,555 cases were fresh and 113,678 cases storage. During the year a notable increase took place in interprovincial or voluntary inspection in Eastern and Western Canada. This increase is indicative of the growing tendency on the part of produce dealers and packers to buy, and track shippers and country dealers to sell, on a graded basis subject to government inspection, thereby applying the principle of quality payment. The buyer is given a guarantee of quality through the medium of the inspection certificate and the markings placed on the case; the seller's interest is safeguarded through the work of inspection being done at the point of shipment and at the time of shipment.

Reports and investigations last season revealed certain abuses apparent in rail and ocean transportation. With the positive knowledge thus obtained, a vigorous campaign was undertaken through the proper channels to eliminate preventable loss through improper methods of handling, packing and stowing aboard ship and so forth. The results of the efforts put forth have been very satisfactory, and the heavy losses previously reported through breakage, have been reduced to a minimum.

One large British importer writing under date of March 17 last gives his experience in reference to Canadian eggs last year, as follows:—

“It is only necessary to say a few words in regard to quality and condition, which on the whole were most satisfactory. It is believed that the exceptionally fine weather which prevailed at the time of production was to some extent responsible, but there was plenty of evidence that the selection, grading, and packing had received the utmost care and attention.”

“I must say that my shippers gave my buyers, as well as myself, every satisfaction in the matter of packing and general outturn of the shipments, and one buyer who bought quite a lot of Canadian eggs forward, actually sent me a letter of congratulation on the way the contracts had been handled, notwithstanding the fact that on the declining market, he had suffered a very severe loss. This, I think, speaks volumes for the Canadian product.”

There have been two prosecutions during the current year for violations of the regulations, one against the Public Cold Storage Warehousing Co., Toronto, for shipping a carload of Chinese eggs to Montreal without inspection as required by the regulations, and the other against the Grand Trunk Railway Co., receiving and transporting a shipment without a Government certificate approving the shipment as required by the Act and amendments thereto. In both cases the actions were dismissed, a written judgment being handed down in which it was contended that the English version of the regulations were obscure while the French version was quite clear that the regulations referred only to Canadian eggs. This judgment practically suspended the application of the egg regulations to imported eggs and has permitted the free movement of foreign eggs within Canada in competition with the Canadian product without any control whatever.

Both previously to and especially since the above judgment was handed down, a special investigation has been under way to procure positive data on the quality of foreign eggs arriving in Canada for domestic consumption. It is now clear from the data thus procured, that steps should be taken to control the quality of foreign eggs marketed in Canada in competition with the domestic product.

Attention has also been directed during the past year to an analysis of the conditions under which domestic eggs are being offered to the consuming public, to ascertain why consumers have experienced so much difficulty and unpleasantness in the purchase of eggs. With this end in view an extensive investigation of the quality of eggs offered the public by retail stores has been undertaken, and reports are on file covering upward of 3,000 retail stores in the principal consuming centres

SESSIONAL PAPER No. 16

in Canada. Low grade, bad and musty eggs were found to be the principal factors retarding home consumption. Realizing that the home market is Canada's greatest market, attention is being directed to placing before the retail merchants and the public at large the desirability of handling only eggs graded in accordance with the Canadian standards, thereby offering the consumer eggs of a definite quality. This practice wherever undertaken to date has met with very gratifying results, particularly in stimulating home consumption, sales have doubled and in some instances trebled, one retail merchant alone reported the sale of over one thousand dollars' worth of eggs in ten days. Certain amendments to the egg regulations are under consideration which will more effectively develop the home market.

EGG AND POULTRY MARKETS INTELLIGENCE SERVICE

The system of distributing daily market reports inaugurated last year has proven quite satisfactory. Through the medium of the Associated Press daily market wires covering the situation throughout Canada appear in the daily press in all parts of Canada the morning after the reports are issued from Ottawa. This very excellent service costs very little from the standpoint of the number of people reached. As has been previously outlined the change necessitated a number of additional correspondents but the cost of these is more than offset by the saving in postage, paper and labour at the Edmonton, Winnipeg and Ottawa offices. Many of the papers using this daily market wire are now giving the department credit for the information.

In addition the Weekly Egg and Poultry Markets Report is still being published. During the past year a revision has been made of the mailing list. A form was forwarded to each address on the mailing list asking whether the recipient wished to continue receiving the report. Over 3,000 forms have been returned and almost daily letters are being received asking why the report has been discontinued. These are from those who failed to fill in and return the application form.

A connection is still maintained with British egg importing houses, ninety-seven of these receiving the Weekly Report and many in return are writing during the course of the year as to the trend of the British market. These letters in addition to one special market letter and three cable correspondents enable the department to keep in close touch with market prices and requirements in Great Britain.

At the Canadian Produce Association Convention in Montreal the question of departmental market reports was one of the subjects under discussion. There was some criticism by representatives of one or two of the larger packing houses, but very strong representations were made by small country dealers and track shippers for the continuance of the reports. They very strongly endorsed the action of the department in the publication of both the daily and weekly reports.

The method employed in gathering market information is the same as in the previous years. Every officer of the Poultry Division is a market correspondent and expected to furnish a daily report on prices, receipts, etc., from the points visited. In addition special correspondents are maintained in Vancouver, Calgary, Edmonton, Regina, North Battleford, Montreal and St. John. The London, Liverpool and Glasgow markets are reported weekly by cable.

The effect of the distribution of United States markets information has been most apparent in connection with the marketing of poultry, especially live poultry. Frequently Buffalo, Boston and New York prices are higher than Toronto and Montreal. Prompt advice regarding this enables Ontario and Maritime shippers to divert their shipments. This has created more competition in buying with the result that Canadian prices for poultry last year compared favourably with the highest on record.

CO-OPERATIVE MARKETING AND POULTRY PROMOTION

The encouragement of co-operative marketing is but one of the many phases of the work carried on by the district poultry promoters and their staffs. Their work includes all phases of the marketing problem as relating to eggs and poultry. These men actually work among the producers, interpret to the producers the various phases of policy as inaugurated and, in turn, recommend to the department the requirements of the producing public in the way of policy. They are at the same time promoters, or better, propagandists, for the particular phase of the work which they have in hand.

The work in one district is by no means the same as in another. Different activities develop in accordance with the needs of particular districts. For instance, in British Columbia the assistance has been extended almost exclusively in the extension of the co-operative marketing of eggs and poultry while in Alberta it has taken on the form of general encouragement, discussion of ways and means of improving the poultry kept on the farm, of marketing the product, and of getting better stock to the districts where no pure-bred stock is kept at the present time. In New Brunswick and in Prince Edward Island the car-lot shipment of live poultry has been initiated and has successfully demonstrated a practical undertaking, following which both private and co-operative enterprise have taken it over. Allied with this work are culling demonstrations and selection of breeding flocks and other pertinent matters relating to the more economic production as well as the more efficient marketing of the product.

In some districts co-operative marketing is much further advanced than formerly; nowhere is this more pronounced than in British Columbia where, following a reorganization of the association and the introduction of more efficient business management, the volume of the turnover has steadily increased, as has also the membership, until to-day the B. C. Co-operative Exchange is one of the most aggressive sellers of eggs on the Pacific coast, not only distributing the product throughout the Dominion but also shipping to New York, and, in the case of at least one shipment, direct to the London (Eng.) market. As a result of the marketing system introduced largely through the efforts of officers of this branch, the poultry industry of British Columbia is to-day in a more satisfactory state than it has ever been before. In the Prairie Provinces co-operative marketing of eggs and poultry is still in its infancy. More volume is required in local centres to make it a pronounced success. In Ontario, during the past year, progress in an organization way has been only nominal, but the quantity handled by local units has steadily increased, the total volume handled this year being fifty per cent greater than last. In Quebec the facilities offered by the co-operatives are largely responsible for the recent increase of the poultry kept in that province. In New Brunswick most attention has been given to the car-lot movement of live poultry and the marketing of dressed poultry co-operatively. The Nova Scotia Poultry Products, Limited, is the major development in a co-operative way in Nova Scotia in the last year and some very satisfying results to producers have been obtained from its operation in the Antigonish, Guysboro, and Lower Cape Breton districts. In Prince Edward Island, the P. E. I. Co-operative Egg and Poultry Association reports another successful year.

SESSIONAL PAPER No. 16

RECORD OF PERFORMANCE FOR POULTRY

Record of Performance for Poultry has now been in operation for two and one-half years. Two record years have been completed, and reports issued giving detailed results of all entries. By a special effort the second annual report was distributed early in March of the present year, in time to be of service to breeders in the buying and selling of hatching eggs and day-old chicks.

Briefly, the objects of Record of Performance may be stated as follows:—

(1) To encourage the breeding of poultry combining high production and standard qualities.

(2) To secure for poultry breeders reliable information as to the sources of such stock.

(3) To demonstrate to breeders the value of trap-nesting and pedigree-breeding in building up high-producing strains of standard breeds of poultry.

(4) To eliminate the advertising of high trap-nest records of doubtful authenticity.

(5) To assist breeders in becoming familiar with the most up-to-date methods of poultry breeding.

This work has grown rapidly in volume since its inception in 1919. Table I gives the comparative entries in 1919, 1920 and 1921. It will be noted that Ontario leads, both in numbers of breeders and birds entered, with British Columbia second and Quebec third. Alberta showed the greatest proportional increase in 1921.

TABLE I

Provinces	1919		1920		1921	
	Birds	Breeders	Birds	Breeders	Birds	Breeders
British Columbia	1,625	10	2,488	16	2,580	25
Alberta	24	2	45	1	2	16
Saskatchewan	120	1	363	3	418	5
Manitoba	203	1	25	1	214	5
Ontario	1,086	26	2,576	33	5,065	40
Quebec	84	8	1,503	16	2,065	18
New Brunswick	182	4	400	7	275	4
Nova Scotia	83	2			120	4
Prince Edward Island	246	11	111	4	110	5
Totals	4,436	67	7,511	81	11,579	122

The second annual report has been in even greater demand than the first one. Entrants report it a great help in making sales of hatching-eggs and day-old chicks from certified birds, at remunerative prices. Reports indicate that many breeders who have certified birds find a ready market for their progeny at double the price that can be obtained for the progeny of non-certified stock.

Table II taken from the second report gives a summary of the results in each province. British Columbia leads in the percentage of birds qualifying for certificates. The percentage of birds qualifying for certificates is somewhat higher than in the first year, due to the better quality of the birds entered, and the fact that each bird's record commenced with the first egg laid in the trap-nest, instead of on the first of a given month, as was the case the first year.

TABLE II
BRITISH COLUMBIA

Total Entered	Total Banded	Qualified R.O.P.	Qualified Advanced R.O.P.	Withdrawn	Died	Failed to Qualify
1488	2,488	979 39.3%	169 6.8%	864 34.7%	199 8%	277 11.2%

ALBERTA

45	44	0	0	44 100%	0	0
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SASKATCHEWAN

363	354	104 29.4%	3 1.8%	64 18.1%	52 14.7%	131 37%
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MANITOBA

25	20	8 40%	0	0	2 10%	10 50%
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ONTARIO

2576	2,539	525 20.7%	89 3.5%	1,188 46.8%	197 7.8%	540 21.2%
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QUEBEC

1503	1,448	228 15.7%	16 1.1%	854 59%	143 9.9%	207 14.3%
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NEW BRUNSWICK

400	400	82 20.5%	7 1.7%	139 34.7%	34 8.5%	138 34.6%
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PRINCE EDWARD ISLAND

111	110	16 14.5%	3 2.7%	29 26.4%	9 8.2%	53 48.2%
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CANADA (TOTALS)

7511	7,493	1,942 26.2%	287 3.9%	3,182 43%	636 8.5%	1,356 18.4%
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The work is gaining in favour rapidly. Public opinion is behind it, due largely to the fact that confidence has been established in the accuracy of the records. This has been the result of careful, intensive methods of checking, both through the inspection staff and in the office. The organization has been much improved during

SESSIONAL PAPER No. 16

the past year. Some inspectors who proved unsuited to the work have been replaced. The clerical end of the work has been developed and a constant endeavour made to devise and apply new checks to the reported productions of the birds. Much headway has been made in this respect, but in order to attain greater results in this direction, additional clerical help is necessary.

Another phase of the work, which has probably not been considered other than by those in immediate charge, is the opportunity presented to gather and publish statistics of the most valuable nature. In all, 23,526 birds have been entered to date, in Record of Performance. Every province is represented. From the daily reports of production of these birds—far greater in number than are available to any other workers—data could be compiled and published in regard to effect on the total egg production, of date of maturity, size of egg, time of starting to lay, etc. These are problems of great economic importance which are occupying the chief attention of the foremost poultry investigators the world over. Where other investigators must confine themselves to their own localities and count themselves fortunate if they have available one-tenth the trap-nest records mentioned above, those in charge of Record of Performance already have thousands of such records from every part of Canada to study. This opportunity to compile data and information of great economic value to poultrymen in every section of Canada, is not being overlooked.

EXHIBITS

The past year has proved one of the most successful experienced for the Branch's poultry exhibits. Egg and poultry exhibits have been staged at the following large exhibitions and poultry shows:—

Nova Scotia—Halifax, Stellarton, New Glasgow, Truro, Amherst; New Brunswick—St. John, Fredericton, St. Stephen, Chatham; Quebec—Valleyfield, Three Rivers, Sherbrooke, Quebec, Ste. Scholastique, St. Casimir (Portneuf Co.); Ontario—Toronto, London, Ottawa, Lindsay, Newmarket, Markham, Norwood, Bobcaygeon, New Hamburg, Exeter, Ailsa Craig, Drumbo, Milton, Burford, Caledonia, Rockton, Monkland, Moose Creek, Kirkhill, Lancaster, Cornwall Centre, Greenfield, Alexandria, Martintown, Renfrew, Glasgow Station, Westmeath, Douglas, Queens Line, Beachburg, Dundas, Kitchener, Hamilton, Galt, Brantford, Guelph, Woodstock, Waterdown; Manitoba—Brandon; Saskatchewan—Regina, Saskatoon, North Battleford, Prince Albert; Alberta—Calgary, Edmonton, Red Deer, Camrose; British Columbia—Vancouver, Chilliwack, New Westminster, Victoria.

Judging by the applications for literature and also the requests being constantly received for exhibits, this means of placing the general public in touch with the work of the branch is still the most popular. Through the medium of exhibits many thousands of people each year glean some idea of what is being attempted in an educational way, and the interest does not by any means stop when a person has given his or her name and address for the purpose of receiving departmental publications. Letters received direct are proof of this.

During the past year exhibit material has also been used for another purpose, namely, that of assisting retailers to make attractive window displays in connection with sale of graded eggs. In the instance of the St. Lawrence market, Toronto, exhibits and candling demonstrations have been staged and talks given on the purchase of a graded product to several thousand people.

One of the very attractive features in connection with exhibits staged during the past year has been the use in connection with exhibits of live birds, good and poor specimens from the standpoint of production of the varieties most popular in the particular district in which the exhibit was being staged.

The use of moving pictures in connection with exhibits is developing very rapidly. It is not possible, however, to stage the pictures at all exhibitions at the

13 GEORGE V, A. 1923

present time on account of the projection machines not being sufficiently powerful to overcome the daylight which cannot be entirely excluded from the screen. This matter, however, is receiving attention, and it is anticipated with a more powerful machine and special screen that arrangements can be made to give satisfactory pictures in daylight.

STOCK YARDS SERVICE DIVISION AND MARKETS INTELLIGENCE

The department, through the Stock Yards Service Division and Markets Intelligence Service, undertakes to regulate the ways and means by which live stock is bought and sold on public stock yards, and as well to further stimulate confidence in production and bring about systematic and intelligent marketing, through the medium of an official source of information as regards local, provincial, federal and foreign supply and demand in live stock and live stock products.

The stock yards work is being accomplished through federal control of stock yards as provided under the Live Stock and Live Stock Products Act, 1917. Under the Act, all public stock yards in the Dominion are subject to federal supervision as regards construction, equipment and operation. The provisions under the Act are enforced through officers of the Live Stock Branch, stationed at the stock yards at Montreal, Toronto, Winnipeg, Moose Jaw, Prince Albert, Calgary and Edmonton, under the direction of the Dominion Supervisor of Stock Yards. The Markets Intelligence phase of the work is provided through the stock yards officers and their clerical and technical assistants at the yards, in conjunction with the Markets staff at the Live Stock Branch, Ottawa.

The enforcement of regulations made under the Live Stock Products Act of 1917, has resulted in the bonding of all commission men, operating on public stock yards; the organization and reorganization of Live Stock Exchanges; the standardization and approval of the rules and regulations under which Live Stock Exchanges operate; standardization of all charges made on the yards by the Stock Yards Company or by commission men, and improvements in the accommodation for live stock.

In continuation of the policy of supplying the producers of live stock with an official Markets News Service, officers of the Branch, located at the central stock yards at Montreal, Toronto, Winnipeg, Calgary, Edmonton and Prince Albert, undertook the classifying, grading and pricing of all live stock offered for sale, obtained detailed information as to the origin and disposition of the stock and procured data on the general condition of supply and demand.

Purchasers of live stock under the Carlot and Free Freight policies of the branch were again given assistance by the stock yards representatives. The activities of the agents greatly facilitated the movement back to country points.

The Daily Markets Telegraph Service inaugurated in 1919 was continued. This consisted of analysis of the condition of supply and demand, telegraphed over the wires of the Canadian Press, Limited, for publication in the daily press of Canada. These wires were prepared by the officers at each of the yards, at 11 a.m. and 4 p.m. daily, and appeared the same evening and the following morning in practically every evening and morning paper in Canada. These have already been conceded an important place in commercial circles.

The Inter-Stock Yards Telegraph Service inaugurated during 1919, consists of an exchange of market wires between stock yards, so that a knowledge of trade conditions on one market may be available on all other markets as soon as the day's trading is established. These telegrams are prepared by the stock yard agents after a careful analysis of the conditions of trading and then wired each day as early as possible to other yards in Canada. Previously only firms which could afford to have a private telegraph service, were able to benefit by a knowledge of conditions at other than their own operating yards.

SESSIONAL PAPER No. 16

The stock yard offices again supplied the local daily press with daily market news, letters and representative live stock sales. The need for absolute accuracy in these reports has resulted in a high quality of material being produced and together with the extended weekly and monthly analysis of supply and demand they have practically supplemented all other sources of markets information. The effect has been the absolute standardization of market reports throughout the Dominion, where, heretofore, many contradictory and unreliable statements of market conditions were circulated.

The weekly markets news service was continuously prepared and mailed to the agricultural press of Canada, to district representatives of agriculture, to a selected producers' mailing list, and to the various provincial Departments of Agriculture. This service consists of an analysis of supply and demand during the current week; statistical tables showing the grading, numbers, average price, price range for bulk of sales, and top price of all live stock offered for sale and, as well, the disposition and comparative receipts of the same.

These reports cover separately each stock yards in Canada. Monthly statistical statements and comments on supply and demand during the month, follow up the weekly report. A statement outlining the general conditions of supply and demand on the following month of previous years, was also supplied. The object of this is to provide producers with full particulars of the condition governing markets during the recognized marketing seasons over a period of years, so that they may liquidate their stock in as intelligent a manner as possible.

Each week, publicity was given to the live stock industry by the distribution of interesting information on the live stock and allied industries, as regards both domestic and foreign fields. This information is distributed through the regular mailing list and over the wires of the Associated Press.

During the year numerous articles touching on the live stock industry were prepared, either voluntarily or by request, for publication in the farm press.

Statements on local and general live stock conditions were prepared during the year for producers, the packing industry and such institutions as banks, railroad companies, etc.

Memoranda on production, distribution and consumption of live stock and live stock products, both domestic and foreign, were prepared for the information of officers of the department.

The branch continued the building up of an extensive information service with reference to the statistical condition of the following: local production and distribution of live stock; conditions of local production; general condition of live stock production and distribution in Canada; foreign live stock situation; world's animal food stuffs and feed stuffs situation; import and export trade in live stock and live stock products; and financial conditions in respect to agriculture.

The service continued the recording of the point of origin, class, grade and sex, of every head of stock offered for public sale at stock yards. It is estimated that the total marketings for the year were in the neighbourhood of three million head. The records cover the sales made during the past five years and are compiled in such a way as to be of tremendous value in estimating the condition and extent of the marketable surplus either locally, provincially, or in the Dominion, at any period of the year. It is obvious that policy to bring about better conditions as regards production for markets and marketing will be given excellent direction through the medium of these records. No other country has such detailed information on marketings of live stock.

In order that the weekly agricultural newspapers and financial and trade journals might have the most up to date market information obtainable, a special market wire is prepared on the opening market of each week, by the stock yards representative, and sent to the farm press in time for publication in the current

issue. The good opinion which the farm newspapers have of this Market Service is manifest in the fact that this special wire is paid for by the newspapers and at their own suggestion.

Extension of stock yards service was made during March 1920, through the appointing of a stock yards agent at the new stock yards, Prince Albert, Saskatchewan. These yards are situated close to one of the most promising feeding areas in Western Canada.

The administration of the policy whereby immature calves offered for sale on public stock yards are subject to condemnation was administered by the stock yards representatives.

During 1920, the branch was successful through the co-operation of the Canadian packers, in obtaining weekly statements from the various plants throughout the Dominion, covering private or country purchases, by shipping points. As from 40 to 60 per cent of the annual marketings of hogs go through direct to inspected establishments, the value of the information obtained can be appreciated. This information is recorded in a similar manner to stock yards sales.

The various companies which supply "patent insides" or "boiler plate" to the local country newspapers, have been provided with a weekly review of the live stock markets. This was undertaken in order to further circulate reliable markets intelligence at country points.

The Markets Intelligence Service undertook the editing and distributing of a weekly analysis of the wool market situation, prepared by officers of the Sheep and Goat Division.

The machinery of producing detailed reports on local shipments of live stock was perfected during the year and reports are now being prepared and mailed periodically to interested parties. The reports consist of the classification and grading of all classes of meat animals shipped by drovers, packers, buyers and farmers organizations, from all shipping points in Quebec, Ontario, Manitoba, Saskatchewan and Alberta.

The stimulation of efficient marketing practice was further effected during the year through the appointment of a stock yards agent at the public stock yards at Moose Jaw, Saskatchewan.

During April, 1921, the Canadian export trade in live cattle was resumed with Great Britain. In order that the project might be intelligently prosecuted, the Live Stock Branch sent a representative to Great Britain to investigate the possibilities of the trade and fully report on conditions under which Canadian cattle are handled and distributed and means whereby the movement might be further stimulated. A detailed report on conditions together with recommendations for the further development of the trade was prepared following the overseas trip. Copies of the report were distributed to the daily and farm press throughout Canada.

Whilst in Great Britain, the officer of the branch arranged for a weekly cable service on the British market for Canadian cattle and bacon. The information is being supplied by the most reliable operators on the market at Glasgow, Liverpool and London. These cables are edited in the branch and given the widest publicity through the medium of the Associated Press of Canada.

A very strong connection was also made with British firms interested in the possible resumption of Canadian trade in store cattle, with importers and distributors of Canadian fresh-killed beef and with distributors of Canadian bacon. A mutual exchange of correspondence on the various phases of the market situation in Canada and Great Britain between the Branch and the above mentioned parties has resulted and has already established a clearer understanding of the problems involved in the export trade in relation to the British market.

Through arrangements made between the Departments of Agriculture and the Department of Customs the branch is now receiving through the courtesy of the Customs Department, statements covering the origin and destination of all classes

SESSIONAL PAPER No. 16

of live stock exported from the Dominion. The obtaining of this information completes the scheme for obtaining a full record of the movement of Canadian live stock during any period of the year.

The energies of the division will be directed strictly to the further development of the policies now in effect. The aim will be to enlarge on the present policy particularly in the way of affording protection to the producer, shipper, and sellers of live stock and as well, in this connection to give as much publicity to the whole processes of supply and demand as possible.

Special attention will be paid to markets information on the hog industry and bacon trade in an effort to contribute to the success of the aggressive policy recently adopted, which has for its aim the stimulation of the Canadian export trade in bacon through the production of a standard type of hog paid for on a quality basis.

Steps have been taken so that in the event of the British embargo on store cattle being removed the Branch will undertake to keep prospective shippers informed as to supply and demand and method of shipping. Also information will be available which will enable those wishing to ship to get into direct touch with reliable firms in Great Britain, a list of the latter now being available in the Live Stock Branch.

SHEEP AND SWINE DIVISION

INTRODUCTION

Although lower market values prevailed for lambs, sheep, hogs and wool, relatively speaking, prices for these commodities were among the highest and most profitable of those pertaining to live stock. As the season advanced farmers appeared to have adjusted themselves to the new level of values and faced the situation by paying closer attention to general improvement in quality, greater use of purebreds and closer adherence to the policy of co-operative marketing. It is true that some flocks of sheep have been sold out but it is noticeable that the owners were largely amongst those who had commenced operations during the war period. Many new flocks have been started by men who have taken advantage of low prices for good grade ewes and the established sheep raisers, whilst probably culling a little closer, are maintaining their flocks at average numbers.

CO-OPERATIVE SHEEP AND LAMB MARKETING

Owing to uncertain marketing conditions, co-operative shipping was much more difficult than during 1920. The drought in Quebec caused early shipments of fairly large numbers of lambs, a large percentage of which were light and unfinished. These early shipments began to arrive in considerable numbers before last year's stocks of mutton were cleared, with the result that the market for lambs, particularly at Montreal, became more or less demoralized and remained so during a good part of the season. Fortunately, a good demand existed for Canadian lamb in the United States and the competition provided helped to maintain prices at a fairly profitable level in Canada.

Co-operative shipments were for the most part confined to the marketing of lambs from ram clubs and from districts where docking and castrating permitted marketing straight carlots of ewe and wether lambs. Associations that had previously marketed were given assistance where necessary. A new feature of the work was the selling of dressed lambs from the Pontiac and Gatineau associations in Quebec. These associations made arrangements to have their lambs slaughtered and wholesaled to the butchers in the city of Ottawa, and handled seventeen carloads of lambs and two carloads of sheep in that way. This was a move to effect more direct sale from producers to consumers. Satisfactory results were obtained but a further benefit would result to farmers if carcasses could be sold on city markets cut into the regular retail cuts rather than in quarters as required at present.

The following is a statement of co-operative shipments for sheep and lambs:—

	No of Cars	No. of Head	Value
Prince Edward Island.....	43	4,176	\$ 29,666 26
New Brunswick.....	22	2,112	12,575 65
Nova Scotia.....	24	2,755	16,423 16
Quebec.....	42	3,860	24,910 61
Ontario.....	9	932	7,922 00

DIPPING, DOCKING AND CASTRATING DEMONSTRATION WORK

Deemonstration, in dipping, docking and castrating have proven one of the most effective means of creating greater interest in modern methods of sheep management. Failure on the part of farmers to dip has resulted in higher costs for maintenance of the flock besides loss in weight of wool and lambs. Neglect to dock and castrate has seriously affected the market price as is shown by the fact that straight carloads of ewe and wether lambs have invariably brought a cent to a cent and a half per pound above normal market values. Demonstration work along these lines was centralized in districts in the counties in which it was undertaken and was associated in so far as possible with the placing of purebred rams. In this way the farmers were encouraged to ship co-operatively and could estimate the value of such work in dollars and cents. The carrying out of these demonstrations was greatly facilitated by the co-operation of the provincial agricultural representatives and agronomists.

The following table outlines the extent of demonstration work by provinces:—

Province	No. of Demon- strations	Attendance	No. of meetings	Attendance	No. of sheep dipped	No. of lambs docked and castra- ted
Prince Edward Island and New Brunswick.....	159	795	57	3,500	7,083	7,009
Nova Scotia.....	183	1,281	51	1,479	6,979	3,645
Quebec.....	250	11,835	200	23,000	3,000	3,200
Ontario east.....	36	252	10	310	3,245	200
Ontario, west.....	403	8,871	27	2,396	16,022	2,230
Manitoba.....	12	72	43	2,262		
Alberta.....			10	750		

In Western Canada demonstration work has not been so essential, especially on the ranges. However, with the advent of the small flock on many grain farms similar work is becoming necessary if the best returns are to be secured and already a start has been made in a few districts in Manitoba, northern Alberta and British Columbia

CO-OPERATIVE MARKETING OF WOOL

The policy of grading wool for Co-operative Wool Growers' Associations was continued in 1921. All western wools were graded at Weston, Ontario, while eastern wools were handled at Guelph, Smiths Falls, Lennoxville, Fredericton, Charlottetown, Truro and Antigonish.

During the grading season of 1921 four expert wool graders were employed temporarily and together with two permanent graders, performed all the grading.

SESSIONAL PAPER No. 16

The strict grading commenced in 1920, naturally met with considerable opposition at first, but has proved to be of great benefit in that the interest of manufacturers in Canadian wools has been increased to a great extent. During 1921 the standard set up in 1920 was followed, and, from the number of new customers reported by the Canadian Co-operative Wool Growers, and from expressions of opinion from textile manufacturers, it would appear that the practice of strict grading was a very important factor in the sale of wool on a dull market.

The graders were instructed to report unusual irregularities in the wool clips offered by contributors and these were analyzed with a view to making suggestions for improvement, either as regards breeding or as regards care and management. The average of wool clips from the different provinces is being analyzed with a view to making suggestions for the instigating of provincial policies which will tend to raise the average of the grades.

The eastern wools on the whole graded out well. A few districts were lacking in preparation, some others showed a need for improved blood in the flocks, while others apparently were careless in the feeding and management of the flocks, evidenced by too high a percentage of vegetable matter in the wool.

In Western Canada the range wools were an exceptionally good lot. A few consignments showed a percentage of brashy fibres, especially in fleeces of older ewes, which indicates the necessity of closer attention to culling and systems of breeding. Consignments from the grain farming sections were seen that improved over last year but there is still much room for improvement, especially in the elimination of seeds and chaff. The following statements show the amounts of the various grades of wool indicating whether western or eastern, range or domestic, also the total amounts graded by associations and by provinces.

WOOL GRADED, 1921

Eastern Domestic Wool—

Prince Edward Island..	29,671	
Nova Scotia..	47,003	
New Brunswick..	40,610	
Quebec..	111,793	
Ontario..	727,792	
	<hr/>	957,489

Western Domestic Wool—

Manitoba..	202,476	
Saskatchewan..	471,741	
Alberta—		
Central Alberta Wool..	42,958	
Alberta Prov. W. Grs..	116,663	
Alberta S. Breeders..	128,570	
British Columbia..	86,443	
	<hr/>	1,088,851

Western Range Wool—

Southern Saskatchewan..	183,222	
Southern Alberta..	180,000	
Verm. Wool Growers..	41,096	
Pincher Creek..	15,502	
	<hr/>	1,820,000

Grand total.. (Lb.) 3,872,825

WOOL GRADING, 1921

<i>Prince Edward Island</i>	Assn. Total	Prov. Total
Prince Edward Island Sheep Brs..	29,671	29,671
<i>Nova Scotia—</i>		
Antigonish Wool Growers..	10,459	
Truro Wool Growers..	36,987	
Sundry shipments..	217	
	<hr/>	47,663

13 GEORGE V, A. 1923

New Brunswick—

New Brunswick Sheep Brs.. 40,610 40,610

Quebec—

Argenteuil Co.. 6,711
Beauharnois.. 5,334
Bedford.. 5,467
Compton.. 16,019
Ottawa.. 16,443
Pontiac.. 25,143
Richmond.. 11,389
Sherbrooke.. 14,217
Stanstead.. 11,070

111,793

Ontario—

Howland Assn.. 15,467
South Manit.. 23,916
Ontario Sheep Brs.. 685,965
Sundry shipments.. 2,404

727,752

Manitoba—

Manitoba Breeders.. 202,476 202,476

Saskatchewan—

Saskatchewan Breeders.. 471,741
South Saskatchewan Wool Growers.. 183,222

654,963

Alberta—

Alberta Sheep Breeders.. 168,570
Alberta Provincial Sheep Breeders.. 116,663
Central Alberta Wool Growers 42,958
South Alberta Wool Growers.. 1,082,154
Pincher Creek.. 15,502
Vermilion Wool Growers.. 41,096

1,466,943

Herringer..
Sarnia Ranch Co..
Harvey.. 504,511
W. Stock Ranches
Lethbridge..
Knight & Watson..

1,971,454

British Columbia—

British Columbia Wool Growers.. 86,443 86,443

Grand total.. (Lb.) 3,872,825

Grade	Eastern Domestic	Western Domestic	Western Range
Fine combing.....	28	737	30,633
Fine clothing.....	8	4,814	32,972
Fine medium combing.....	1,852	23,867	395,985
Fine medium clothing.....	2,193	36,658	175,377
Medium combing.....	128,534	154,724	498,870
Medium clothing.....	31,433	147,380	227,735
Low medium combing.....	335,793	389,394	301,260
Low medium clothing.....	762	8,376	111
Low combing.....	220,619	102,213	56,090
Low clothing.....	479	1,082	
Coarse	130,706	18,168	10,662
Mohair.....	4,281	1,403	140
Medium grey and black.....	4,454	4,710	2,015
Coarse grey and black.....	1,747	868	145
Fine burry and seedy.....	1,209	7,378	16,845
Medium burry and seedy.....	35,709	31,500	24,952
Hard cotts.....	13,008	2,772	140

SESSIONAL PAPER No. 16

Grade	Eastern Domestic	Western Domestic	Western Range
Superfines	18,111	17,905	857
Fine pulled			
Medium pulled	279	13	75
Fine dead	142	179	684
Medium dead	2,710	1,334	2,811
Murrain	54	359	420
Damaged	118	400	1,614
Sweepings	211	265	480
Fine tags	283	453	3,117
Medium tags	6,127	13,955	25,497
Washed tags		44	
Sisal	3,110	16,683	1,857
Sisal black		7	
Low black sisal		50	
Kemp		1,185	419
Coarse kemp		85	
Down and misty	2,010	14,367	4,962
Tubwashed	1,389	128	255
Fine washed	1,990	1	
Seedy tubwashed		26	
Low washed	49		
Medium washed	201		
Coarse washed	3,037	1	
Fine med. clothing washed	23		
Washed fleece staple grade	59		
Fine black		1,011	5,356
Low black		65	5
Seedy black	6	1,057	209
Coarse seedy black		102	
Fine seedy black		17	
Ortuno black	85		
Medina black washed	4		
Fine seedy		6	
Slightly seedy		58,462	49
Hard seedy		10	
Heavy seedy		665	
Barry		1,319	
Barry and seedy		578	
Slightly barry and seedy	502	16,270	823
Coarse barry and seedy	148		
Black barry and seedy		33	
Fine barry black			20
Medium barry black			10
Scutcheon	2,870		
Picks	33		
Medium seedy head		18	
Seedy dead	60	1,390	2,280
Barry dead	110		
Barry locks			414
Seedy locks	2		91
Medium locks	2		
Locks and pieces	401		
Coarse bird cotts	246		
Black cotts		6	
Seedy cotts		242	
Piled	2		
Fine Grey		20	
Low grey and black		46	
Seedy grey and black		204	
Fine grey and black		93	272
Low Karakule		18	
Coarse grey and black Karakule		207	
Karakule black		377	
Low Karakule black		3,036	
Medium Karakule black		91	
Seedy Karakule black		17	
Seedy medium		34	2
Tubwashed medium		10	
Total	957,489	1,088,851	1,826,485

ENCOURAGEMENT OF CO-OPERATIVE WOOL MARKETING

Part of the time of the sheep and swine promoters was taken up in work calculated to encourage and increase the co-operative shipment of wool. This work was accomplished by attendance and addresses at wool growers' annual meetings held during the winter months, at short courses and by demonstrating the shearing and preparation of wool for market during the shearing season. At many of the short courses, annual meetings and other places demonstrations in wool grading were given. Assistance was also given to local associations in the collecting and shipping of wool.

The prevailing low prices for wool made assistance in co-operative wool marketing very difficult, and had a tendency to curtail co-operative shipments. Furthermore, there appeared to be a growing tendency in the direction of home manufacture.

BOYS' AND GIRLS' SWINE CLUBS

A definite policy for boys' and girls' swine clubs was inaugurated in 1921 in order that effective work might be undertaken in developing community breeding of hogs, thereby effecting improvement in quality, also by paying special attention to marketing to secure recognition in price for breeding and finishing. Under this policy each club selected one breed of hogs and each member agreed to purchase two or preferably three hogs, one of which would be retained as a brood sow while the barrows would be finished for market. Provisions were made for exhibiting at the local fair and later for the shipping of a carlot of finished hogs to market where the various carlot entries would compete and prizes be awarded. Club members are also encouraged to visit the market at the time the carlots are shipped in order that they may see the hogs sold, study stockyard practice, visit the packing plants and participate in the swine judging competition.

The policy was inaugurated rather too late in the season to attain large proportions this year. However, with the assistance of the Provincial Departments of Agriculture, clubs were organized and carried forward successfully in Quebec, Ontario, Manitoba, Alberta and British Columbia.

The supply of pigs for the clubs was specially selected and, while in some cases, the pigs were available in the district, in other cases, the entire supply had to be purchased outside the club area. The sows retained by club members will be bred for spring litters. The surplus of pigs produced from sows in clubs already organized will be used as a basis of supply for new clubs next spring. In order that a high standard might be maintained in the progeny from these sows, the branch on request, has loaned a boar to a number of the clubs, for the use of club members.

The pigs when finished and shipped to market as carload lots were outstanding as regards uniformity, breeding and finish, although in several cases there was room for improvement, owing to the scarcity of young pigs last spring, necessitating a minimum number to select from. The boys and girls have taken a keen interest in the work from start to finish and there is every indication that the project will reach much larger and more general proportions next year; in fact, a large number of requests have already come to hand for information in organizing and already a considerable number of new clubs are in the process of organization and sows are being selected for breeding this fall.

The following table outlines the scope of the club work for 1921 showing number of entries at local fairs, number of carlot entries, number of contestants in judging competitions and prize moneys paid:—

CARLOT ENTRIES

Province	No. of carlots	No. of	Average price		Amount in prizes
			\$ cts.	\$ cts.	\$ cts.
Ontario	8	185	7 00—11 00		595 00
Quebec	3	10	7 50—9 60		105 00
Manitoba	5	150	11 70—12 00		200 00
Alberta	3	120	9 00—9 25		150 00
British Columbia	5	113			200 00

LOCAL COMPETITIONS

Province	No. of clubs	No. of Entries	Amount in prizes	L.S.B. paying one-third
			\$ cts.	\$ cts.
Ontario	12	217	1,409 00	469 36
Quebec	*2	12	57 00	19 00
Manitoba	6	72	82 00	127 33
Alberta	4	58	346 00	115 32
British Columbia	4	40	217 00	72 33

*Only one club had local competition.

SWINE JUDGING COMPETITION

Province	No. of Entries	Amount in Prizes
		\$ cts.
Ontario	52	25 prizes 325 00
Quebec	10	10 " 55 00
Manitoba	112	25 " 325 00
Alberta	12	12 " 234 00
British Columbia		

SWINE EXTENSION ACTIVITIES

In Western Canada where there 'is an abundance of rough grains which, at present prices, are difficult to market with a reasonable margin of profit, hogs are again coming into popularity and many districts are naturally concerned about starting with a breed that will prove economical from the standpoint of production, and profitable from the standpoint of market type. The Peace River District in Alberta, which is perhaps the farthest removed from market, was anxious to evolve a policy that would 'ensure continued success in swine raising. Following a number of meetings which were held in June, the farmers appeared unanimous in their decision to produce bacon hogs, and organization began with this object in view. During the fall fifty-three pure-bred Yorkshire boars and sixty-nine pure-bred sows were purchased by farmers in the district. These purchases will provide the nucleus for the breeding stock of the district and will tend to insure the marketing of a superior 'bacon hog. Work of a similar nature, though on a smaller scale, has been started in a few other districts.

13 GEORGE V, A. 1923

CO-OPERATIVE SWINE AND CATTLE MARKETING

Some twenty-two cars of hogs, four cars of calves and eleven cars of cattle were shipped co-operatively from the Maritime Provinces and one car of hogs co-operatively from Quebec. The co-operative shipment of cattle was not encouraged excepting for the surplus above the demands of the local market. Cattle prices were so low during the year that unless a fairly good grade of stock was shipped there was very little left after freight and marketing expenses were deducted, especially in districts far removed from market. The marketing of good veal calves seemed to offer possibilities for the development of a large field of effort. A few well finished veal calves of the right weight and size brought better returns than older cattle of inferior grade and quality. This suggested the advisability in dairy sections at least, of finishing the dairy steer and heifer calves for prime veal at six weeks to three months of age rather than carrying them over and marketing at a later date as grass calves or as yearlings and two-year-olds. A new venture was the shipping of seven cars of cattle and one car of sheep from Nova Scotia to St. Johns, Nfld., where a good market was found for a limited supply.

Co-operative shipments of hogs, especially from Prince Edward Island, were very successful and netted the farmers a gain of one to two cents a pound above local quotations. The co-operative shipments removed all possibility of congesting local markets and helped maintain local prices at a higher level.

SHORT COURSES IN SHEEP AND SWINE MARKETING

A new phase of activity developed in 1921 was the holding of sheep and swine marketing courses. Seventeen were held in Ontario and were outlined to cover the outstanding phases of co-operative marketing in relation to sheep and swine. Each course covered three full days. Practical demonstrations were given on judging market classes of lambs and hogs, judging dressed carcasses, proper methods of cutting carcasses, selecting breeding stock, wool grading, preparation of wool for market and modern problems in management. Lectures were also delivered on co-operative marketing, feeding and management, and present-day problems of the sheep and swine industry.

In several cases the courses were concluded with a lamb banquet. Canadian lamb was served with a view to popularizing lamb as a meat. Prominent speakers were secured to give addresses on current topics. Moving pictures also added to the enjoyment of these evenings.

In Alberta, Manitoba, Quebec and at several points in the Maritime Provinces courses of a similar nature but on a less extensive scale were conducted and were well received, particularly a series held in the Peace River District of Alberta, where 2,300 adults attended the short course demonstrations and meetings.

RAM PREMIUM POLICY

To date the first premium has been paid on a total of 981 rams and the second premium on a total of 467 rams covering the two years in which the policy has been in operation. Men receiving the first premium have qualified or will qualify for the second premium, indicating that the regulation covering docking and castration is having practical results. The premium policy has probably attained more effective results this year than in the past because on account of falling prices and general scarcity of money among farmers there would have been a tendency to continue the use of the scrub ram. The drop in pure-bred prices to levels proportionately with wool and lambs and the application of the premium policy has counteracted this tendency and made it possible to encourage the wider use of pure-bred rams with the result that more new applications have been received under this policy in 1921 than for any previous year.

SESSIONAL PAPER No. 16

This policy has also been a very effective means of encouraging docking and castrating. Many farmers desiring the second premium have applied for demonstrations and these, when held often, led to the general practice of docking and castrating in the district, thus effecting a marked improvement in the appearance of the lambs.

The following table gives the number of applications for premiums received from each province, indicating also the breeds of rams purchased:—

FIRST ANNUAL PREMIUMS PAID

Breed	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
Oxfords	6	30	23	179	50	1		6	1
Shropshires	3	17	6	113	46				
Hampshires	4	3	1	45	3				
Leicesters	3	1	6	68	14	1	1		
Lincolnshires	1		1						
South Downs		1		2	3				
Cheviots		1	2	5					
Dorset Horn			1						
Suffolk					1				
Cotswold				2					
	17	53	40	414	117	2	1	6	1

Total—651

SECOND ANNUAL PREMIUMS PAID

Breed	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
Shropshires	13	21	12	73	20			5	3
Leicesters	5	1	6	53	5	1	1		
Oxford	5	12	28	57	52	6	5	6	2
Hampshires	1	5	5	27					1
Lincoln	2			1	4				
South Downs									
Cotswold		1	1	1	1				
Cheviot		1	7	8	1				
Dorset			3		4				
Suffolk							1	1	1
	26	41	62	218	87	7	7	12	7

Total—467

SHEEP FEEDING COMPETITION

These competitions were arranged for in co-operation with the Quebec Department of Agriculture, with a view of encouraging better feeding and management of our flocks in order that the pure-bred rams and ewes which are gradually replacing the common sheep, will receive proper care and attention. It would not seem advisable to encourage our farmers to purchase high-priced pure-bred sheep until there is assurance that they will receive more feed and better management than is generally given at the present time.

The rules governing these competitions allowed any farmer to compete who was the owner of at least ten grade ewes with a pure-bred ram at the head of his flock. Breeders of pure-bred sheep were not eligible to enter. The number of entries in each contest was placed at a minimum of twenty-five and such entries

were required to be given to the secretary of the agricultural society on or before November 15, 1921. Two inspections were made, one in the spring and one later in the season before the lambs were marketed. At the time of the first inspection wherever possible lambs were docked and castrated. During the summer, agronomists made special arrangements for dipping all flocks entered. At the time of the second inspection any improvements noted were credited to the competitor.

The money required for prizes was obtained by grants of fifty dollars given by both the Live Stock Branch and the Provincial Department of Agriculture to each contest. Additional prizes were made up from the entry fee of fifty cents required from each competitor. Prizes for each competition were as follows:—

1st prize	\$25 00
2nd "	20 00
3rd "	17 50
4th "	15 00
5th "	12 50
6th "	10 00
7th "	7 50
8th "	5 00
9th " . . . . .	....
Total	<u>\$112 50</u>

SPECIALS

A gold medal was given by Mr. P. Rodrigue, District Sheep Promoter, Live Stock Branch, Ottawa, for the contestant receiving the highest score. This medal was won by Mr. Joseph Jauvin, St. Joseph d'Alma, Lac St. Jean, on an exceptionally well graded flock of Oxford Downs.

A silver cup was given by Mr. X. N. Rodrigue, Instructor in Breeding, Department of Agriculture, Quebec, for the best flock from all the contestants. This cup was won by Mr. Ernest Poulin, St. Come, Beauce county, on a flock of grade Hampshires.

As these competitions were the first of their kind held in the province of Quebec, the number for the year was limited to ten. The results obtained, however, would warrant increasing that number another year. Numerous requests for such competitions have already been received from other counties. It is proposed that the number of entries required for each competition be reduced from twenty-five to fifteen and the organization work be done by farmers' clubs rather than under the auspices of agricultural societies. This would allow of a larger number of competitions and would give preference to districts where ram clubs have been formed. The time required to inspect the flocks over an entire county is an important factor, since the work of inspection must be done within a limited time. It seems advisable also, to make a regulation to the effect that the last inspection be at least eight days before the lambs are marketed. This will allow a better opportunity for marketing co-operatively and thus more fully demonstrate the improvement effected at market points.

The counties in which competitions were organized were: Compton, Sherbrooke, Dorchester, Rimouski, Temiscouata, Charlevoix, Lotbinière, Beauce and Lac St. Jean. The total number of flocks entered was 272, representing 4,080 sheep and as many lambs. The inspections presented an opportunity to discuss the problems regarding the care and management of the flock with individual sheep-raisers and in many instances this had the effect of bringing about improvements before the second inspection was made. This was particularly true in connection with housing and the provision of feeding racks.

SESSIONAL PAPER No. 16

RAM CLUBS AND PLACING OF PURE-BRED RAMS

The organizing of ram clubs and breeding centres was further extended in Ontario, Quebec, the Maritime Provinces and Alberta. The most extensive work of this nature was accomplished in Quebec, where four hundred rams were placed with fifteen new clubs. The original idea of placing only rams of one breed with a club has been strictly adhered to, and the extent to which Quebec farmers have accepted this policy is demonstrated by the fact that, although a minimum of twenty-five rams was required for a club, as high as thirty-six rams of one breed were purchased by one club, and for the fifteen new clubs organized the average is considerably above the minimum of twenty-five head.

As a result of the organization of ram clubs in Quebec, a sheep fair was held at St. Georges in which ten clubs participated, exhibiting some two hundred pure-bred rams, and some six hundred market lambs, the progeny of pure-bred rams purchased during 1920. Prizes were awarded for pure-breds of the Oxford, Shropshire, Hampshire and Leicester breeds, and in the market classes prizes were awarded for pens of ten head, pens of five head, and for ram and five of progeny. The entries offered an excellent opportunity for comparison of progeny by breeds and this point was closely studied by the five thousand people in attendance. At the close of the fair the lambs were sold by auction to packers' buyers and commission men. Two carloads were sold at \$7.25 per cwt., and four carloads at \$6.85 per cwt. (F.O.B. country points); these prices were from 85 cents to \$1.25 above local quotations for general stock. The entire six hundred lambs averaged 91 pounds at loading point and were considered ideal from a mutton standpoint. Almost every exhibitor and onlooker noted the uniformity in type, quality in fleshing, increased weight as compared with common breeding and noticeable improvement in wool resulting from the use of a pure-bred, all of which, combined with docking and castrating, added to the selling qualities of the lambs and were jointly responsible for the price obtained. The following is a statement of the ram clubs organized and rams placed in Quebec:—

County	Oxfords	Hamp-shires	Leicest-ers	Shrop-shires	South Downs	Total
Terrebonne	20		5	8		33
Beauce	50	2	6	59		117
L'Islet	10		22	22		54
Rouville			5			5
Frontenac	77	37	5	57	2	178
Lake St. John	18					18
Compton	4					4
Richmond				1		1
Wolfe	2					2
Verchères			4			4
Matane			1	3		4
Pimouski			4			4
Quebec				1		1
Arthabaska			5			5
Totals	181	39	57	129	2	408

In western Ontario the placing of rams was confined mostly to two counties, and thirty-eight head were placed. The success which attended the work in the two counties will undoubtedly reach larger proportions during 1922, especially in a number of the more northerly districts. In eastern Ontario the branch representatives co-operated with the provincial department in the placing of sufficient rams in three counties to ensure co-operative shipments of market lambs of superior type.

Some forty head of pure-bred rams were placed in Cape Breton Island and general assistance was given in effecting exchanges and assisting purchasers in other parts of the Maritime Provinces. A considerable number of rams were also dis-

tributed to farmers in the Peace River district of Alberta where the pure-bred is an essential factor in improving the foundation stock of the ewes which are of average to common breeding.

There appears to be a growing tendency on the part of farmers to eliminate the scrub ram. In provinces where organization has been effected the demand for pure-breds exceeds the supply. Prices of necessity have reacted to a proportional level with market values for wool and lambs, but there is a growing recognition of breeding and quality and the breeder of good individuals should find a ready market at remunerative prices.

GRADING OF PURE-BRED RAMS

As in Prince Edward Island, New Brunswick and Nova Scotia, the sheep breeders in Quebec and Saskatchewan expressed themselves favourable to grading. Consequently, the grading was performed in the four eastern provinces on the same basis as carried out last year in the three Maritime Provinces. In Saskatchewan, grading work of a similiar nature was performed by the Provincial Department of Agriculture after consultation as to methods followed elsewhere. A total of 823 rams were graded by the Live Stock Branch graders.

In provinces where grading has been previously performed, breeders were still keenly interested and in Quebec where grading was undertaken for the first time, the graders report everyone appreciative, anxious to ask questions and seeking information *re* breed type. In many instances, it was apparent that there was a lack of knowledge on many of the fine points in breed type, and wherever possible the graders spent considerable time discussing the good and bad points of the flock in question; even matters of feeding and flock management were discussed repeatedly and suggestions for improvement left with the farmer.

Uniformity in grading from the standpoint of breed type was maintained throughout, although the graders state that owing to apparent divergent opinions which exist as regards types within the breeds, problems often presented themselves which required careful study and thought before making decisions. It is hoped, however, that as a result of this year's grading and the follow up work on the part of the breeders themselves, a slightly higher average of grades will be established during 1922.

As a result of the grading a much wider market for the sale of graded rams was effected within the provinces. Purchasing agents for ram clubs naturally made their selections from graded flocks. Grading also permitted a much wider sale by mail as purchases could be made with the knowledge that an expert had passed upon the flock. Grading insured the good breeder against the scrub pure-bred, previously sold to the detriment of high-class pure-breds.

The quality of the rams was designated through the star system. Three star rams were those considered good enough to head a pure-bred flock. These rams were of good size, typical of the breed, with superior conformation, and fleeces of good character, density, quality and weight. Two star rams were those reasonably good in breed type and having sufficient scale; in fact, all rams denoting utility and strength and considered good enough to head a grade flock. The one star rams were those that were not considered good enough for breeding purposes.

SESSIONAL PAPER No. 16

The following is a statement of the grading by provinces:—

PRINCE EDWARD ISLAND

Breed	XXX	XX	X
Cheviots	3		
Lincoln	1		
Shropshires		2	6
Oxfords		2	2
Leicesters	2	3	
Total.....	6	7	8

NOVA SCOTIA

Shropshires	22	24	8
Oxfords	10	10	5
Leicesters	1	4	
Southdown	2	2	3
Hampshires		2	
Total.....	35	42	16

NEW BRUNSWICK

Shropshires..	3	25	
Oxfords	18	8	
Hampshires..		2	
Leicesters	17	12	
Cheviots	6	11	
Dorsets		4	
Cotswolds		2	
Total	44	64	

QUEBEC

Oxfords	70	40	36
Leicesters	117	152	39
Shropshires	66	35	13
Hampshires	25	11	5
Cheviots	19	15	16
Cotswolds	19	4	3
Lincoln	11	3	
Total..	327	260	112

Grading has already tended to unify type within the breeds and if performed for a number of years will undoubtedly do much to eliminate the scrub pure-bred, encourage the more general use of pure-bred rams and improve the general quality of pure-breds.

DISTRIBUTION POLICY FOR RAMS AND BOARS

In the administration of this policy, discrimination was exercised in dealing with new applications for the loan of rams and special consideration was shown those applications coming from districts where returned soldiers have settled, newly settled districts, and districts where sheep improvement appeared essential.

Members of older associations thoroughly appreciate the advantages of using a pure-bred ram and where Branch rams have reached the end of their period of use-

13 GEORGE V, A. 1923

fulness, little difficulty has been experienced, in encouraging the purchase of rams for individual use, thus ensuring a continuation of flock improvement effected by the rams on loan.

As a result of the discrimination in approving new loans, there has been a considerable restriction in distribution, but a good number of rams are still in service as shown by the following statement:—

Province	Oxfords	Shrop.	Leic.	Line	Hamp.	Chev.	Suff.	Ram-bouillet	Total
Ontario ..	10	10	15	3					38
Manitoba ..	33	1					1		35
Saskatchewan	2								2
Alberta ..	3	7							10
British Columbia	3							1	4
Quebec.....	21	52	39	1	8	9			130
Total.....	72	70	54	4	8	9	1	1	219

Owing to the fact that the swine industry had recently suffered a severe setback and many districts were under the necessity of starting almost at the beginning again, especially in Western Canada, it was felt that more leniency should be exercised with regard to the loan of boars in order that farmers would be encouraged to breed the right type of hogs. There has been a tendency to increase rather than decrease the number of boars loaned. The growing movement toward organization of Boys' and Girls' Swine Clubs has resulted in a considerable number of applications for loan to club members and same have been favourably considered. In view of the reviving interest in the swine industry, there is likely to be a much larger demand for the loan of boars during 1922. The following statement shows the number of boars of each breed on loan at the present time, by provinces:—

Province	Berk.	York.	Duroc.	Chester.	Total
Quebec.		19		2	21
Ontario. . .		3			3
Manitoba. . .	3				3
Saskatchewan.....	4	1	3		8
Alberta ..	2	1	3		6
British Columbia ..	3	1	2		6
Total.....	12	25	8	2	47

MILCH GOAT EXTENSION WORK

Apart from British Columbia which is recognized as the leading goat province of the Dominion, considerable interest is developing in milch goats, especially in Ontario. The Ontario Milch Goat Association, which was organized during 1920, has a fairly large membership, and made an excellent exhibit of milch goats at the Canadian National Exhibition, Toronto, during 1921. As a large number of the members are just commencing to establish a flock of goats, the association applied to the Live Stock Branch for the loan of two bucks and were supplied with one Anglo-Nubian and one Saanan, both being purchased in British Columbia. These bucks should do much to improve the Ontario foundation stock and place the breeding of goats in the province on a more solid footing.

There is a big demand for breeding does and as the supply cannot be met in Canada a considerable number of purchases have been made in the United States. During the year a large number of enquiries were answered regarding feeding,

SESSIONAL PAPER No. 16

housing and care and management. Many beginners have been advised with regard to purchases and generally speaking the industry has received encouragement in every way possible.

INVESTIGATIONAL ACTIVITIES

Sorting and scouring tests of Canadian wools are again being made. With a view to giving Canadian wools publicity abroad, these tests during 1922 are being conducted at Bradford, England. In this way, a most reliable examination will be secured and the report should indicate how Canadian wools compare with British and other colonial wools sold on the British market.

Realizing that there was a wide spread between domestic, wholesale and retail prices of meats, an investigation was made with a view to analyzing the situation and suggesting remedies. Information secured indicates that there has been a considerable increase in the number of butcher shops operating during the last four or five years. This, however, seems to have had no appreciable effect on the spread between wholesale and retail prices. In cities and towns where farmers are allowed to operate in the sale of cut up meats, there is a more direct sale from producer to consumer and retail prices seem to have been more in line with the prices received by the farmer for the live animal. It was further noted that in cities where the sale of cut up meats is prohibited, the sale of dressed meats in quarters, whether of beef, pork or lamb was made almost entirely to butchers and that, although prices were often very reasonable, the consumer received little or no advantage in price in the purchase of the more cheaply marketed local meats.

Experiments were conducted in a number of packing plants for the purpose of comparing the relative market values of bacon hogs and hogs of the "Thick Smooth" type. Fifty hogs of each type were selected at each of four plants. When killed, dressed and cut up into the regular retail cuts separate weighings were made for each cut and portion and the selling values estimated on the basis of current prices for the various marketable products. These experiments indicated the necessity for feeding to proper weight and finish before marketing. The bacon hogs when properly finished carried a higher percentage of the high priced cuts and had less trim than the "Thick Smooth". The fat was also more evenly distributed and firmer and the lean meat had a wider distribution throughout the body. The difficulty experienced in securing hogs of uniform age and finish and the limited number of experiments conducted, would not warrant a conclusive statement as to the relative values of the two types. However, observations made and data secured would indicate that generally speaking, the bacon hog kills to better advantage and the produce is of superior quality.

SHEEP, WOOL AND SWINE EXHIBITS

Exhibits designed for display at both eastern and western fairs illustrated the development of the home market for mutton, lamb and wool, and the importance of the export trade in bacon.

The extent of imports from New Zealand and Australia was shown, to indicate that there is still room for expansion of the industry if Canada's needs are to be met entirely from the supply of Canadian product. A comparison of the per capita consumption in Canada of lamb and mutton as compared with Britain indicated the possibilities of increasing the wider use of lamb in the Dominion.

The wool exhibits displayed the various classes of woollen products such as are being manufactured by Canadian manufacturers from the common grades of Canadian wool. The correlation of the virgin wool with the manufactured article did much to direct the attention of the Canadian consumer to the quality and style of Canadian goods manufactured from Canadian wools, and this should be effective in creating a larger market for Canadian goods and indirectly a better sale for Canadian wools.

The Canadian bacon trade was depicted as to its present status as a source of supply for the needs of the British market. The factors which built up the Danish industry and enabled her to regain her trade at the close of the war were set forth. Attention was also directed to the possibility of competition from United States sources. Canadian possibilities in hog production were indicated by the vast amounts of rough grains produced while the success of the industry depended upon quality in product, a continuous supply, expertness in manufacture and natural salesmanship.

Attention was also given to featuring market classes in sheep and hogs, finishing for market, diseases, breed improvement and management.

THE SEED BRANCH

The Seed Branch encourages the production and marketing of superior seeds for home requirements and export; maintains analytical services for the testing of seeds, feeds and fertilizers; provides inspection service for the administration of the Seed Control, Feeding Stuffs and Fertilizers Acts; and maintains the Seed Purchasing Commission.

SEED AND FEED TESTING

During the year April 1, 1921, to March 31, 1922, the number of samples tested at each laboratory maintained at Ottawa, Toronto, Winnipeg and Calgary was as follows:—

	Ottawa	Toronto	Winnipeg	Calgary
Trade	11,556	1,757	2,331	3,995
Customs	2,493	332	1,251	1,605
Official	675	...	450	188
Feeding stuffs	396	...	...	7
Trade investigation	475	...	901	450
	15,595	2,089	4,933	6,245

A new laboratory was opened at Toronto in December with a view to relieving congestion at the Ottawa laboratory and for the purpose of giving more efficient service to Toronto and western Ontario. Unfortunately considerable difficulty is being experienced in finding a suitable officer to take charge of this laboratory.

NATURE OF TESTS

Samples received are listed as Trade, Customs, Official and Investigation, according to the source and object for which information is desired.

Trade samples are those received from merchants, farmers and institutions.

Customs samples are sent by customs officials in connection with the importation Order in Council.

Official samples are those taken by inspectors from lots suspected of being sold in violation of the Seed Control and Feeding Stuffs Acts. Prosecutions are based on the results of analyses of such official samples.

INVESTIGATIONS

During each year much special investigational work is done which involves large numbers of tests not listed in our reports. The following are some of the investigations now being conducted in the various laboratories:—

(a) The influence of frost on the vitality of western cereals.

(b) Experiments on the longevity of field and vegetable seeds.

SESSIONAL PAPER No. 16

- (c) Effect of heat on the vitality of corn (corn borer investigation in conjunction with the Entomological Branch).
- (d) Studies of Canadian-grown red clover seed. This work is being conducted in collaboration with European and American workers, and involves a study of the characteristic weed seeds of the red clover seed producing areas in Europe and North America.
- (e) The value of germination tests as compared with field tests.
- (f) Study of seed-borne diseases.
- (g) The testing of standard samples supplied by the European Association of Seed Analysts and the Association of Official Seed Analysts of North America with a view to the standardization, in so far as practicable, of laboratory methods of seed testing.
- (h) Investigation of the composition of stock foods and tonics sold in Canada.
- (i) Studies of the materials in ground feeding stuffs together with the best methods of their identification and estimation.
- (j) Impurities and adulterants used in commercial feeding stuffs.

EDUCATIONAL WORK

Bulletin S-8, Weeds and Weed Seeds, has again been reprinted to meet the constant demand for this publication. In conjunction with the Chemical Division of the Experimental Farms Branch a bulletin on Commercial Feeding Stuffs was published, in which were given the results of a large number of microscopical examinations on samples of feeding stuffs taken throughout Canada.

A bulletin on Seed Testing in North America is at present in preparation, together with several leaflets dealing with the composition of feeding stuffs.

Considerable progress has been made in the formation of a representative collection of feeding stuffs, and of the ingredients used in their manufacture together with the impurities and adulterants most commonly found therein.

MICROANALYSIS OF FEEDING STUFFS

The work of microanalysis has been considerably developed during the past year. This new and highly technical process has been the means of disclosing many evidences of fraud and misrepresentation, and has already proved of value in the control of feeding stuffs offered for sale in Canada.

A large number of feeds, cereal products, legumes, oil meal and medicated feeds have been examined, and considerable misrepresentation in respect to the statement of contents has been revealed. Common adulterants found were: cocoa shell, rice hulls, oat hulls, corn cob, peanut hulls, flax bolls, screenings and plaster. Vital weed seeds in samples designated as "pure" under the Feeding Stuffs Act have been present, in some cases as high as 5,000 per ounce of feed. In other samples there has been as high as 12 per cent of ground weed seeds. Certain feeds contained considerable ergot; others, smut or similar fungi of objectionable nature. A few samples also were found to have been heated; others to have soured or to contain large quantities of ground insect remains, indicating the use of old or inferior grain. Often where chemical analysis indicates an apparently wholesome feed, microanalysis has disclosed the presence of some harmful weed seed or adulterant which in many cases would readily explain the complaints of feeders in regard to the unpalatability or injurious effects of certain feeds.

The results of microscopical analyses of official samples of feeding stuffs taken in various parts of Canada have shown a number of violations of the Feeding Stuffs Act. As a result several prosecutions under this Act are now pending, which it is hoped will have a beneficial effect on the trade in commercial feeding stuffs.

THE SEED DIVISION

The reorganization that followed the addition of the Feeding Stuffs Act and the Fertilizers Act for administration by this branch has made necessary some re-alignment of the duties and responsibilities of the principal officers. Formerly the officer who was in direct charge of this division also discharged the duties of chief inspector. Since the district inspectors are now administering three laws, instructions to them are issued by the seed commissioner.

The Chief of the Seed Division devotes his attention to the study of production, to interprovincial or interdistrict commerce in seed supplies, and to the world production and international trade in seeds of all kinds. Laws and regulations applied to the export and import of seeds by various countries have a very important bearing on Canadian seed supply, and in consequence on the regulations that ought to exist to protect Canadian agriculture against inferior seeds from other countries. This forms the particular study of the Chief of the Seed Division.

During the past year excellent progress has been made in the development of seed production centres. The seed fairs that were first organized twenty years ago, and the field crop competitions that were started in the Prairie Provinces in 1906, have been guided, with some unfortunate interruption because of wartime conditions, into a fairly well organized system for the production, assembling, cleaning, grading as to quality, and distribution of superior quality seeds of our principal staple crops. The system of grading of seed supplies has proven to be popular and of much benefit to agriculture. The grade designations for seeds of our principal crops are registered, Extra No. 1, No. 1, No. 2, No. 3, and Rejected. It is now confidently expected that provincial co-operative organizations will proceed to co-ordinate the efforts of their seed growers with a view to a better and more economical system of distribution of the superior quality seeds.

For this spring's planting there has been imported stock seed of three varieties of white clover and three varieties of orchard grass seeds from Great Britain, Denmark and Sweden. These have been placed with a view to the development of seed producing centres for each kind and variety, and in order to create an export trade in these seeds.

Exports of seed supplies were formerly restricted largely to clover seeds that were produced in southern and central Ontario. The area for the production of these seeds has been extended and the quantity for export increased. In addition considerable quantities of our northern-grown superior quality seed grain and seed potatoes have been exported and the demand for them has been increasing. The demand for Canadian-grown fibre flax seed had become depressed for a time, but conditions in this respect are improving.

Importations of red clover seed during the past season gave cause for some anxiety during a brief period. It is generally known that red clover seed of southern origin is not winter hardy in Canada. As a rule comparatively little red clover seed of southern origin is imported into Canada, inasmuch as nearly one half of the red clover seed produced in Canada is available for export. It is anticipated that in future years considerable quantities of southern-grown red clover seed may be offered in Canada at reduced values because of now being placed under severe restriction in other northern countries and states, and it may be considered advisable to provide legislation that will enable this department to safeguard Canadian agriculture in this matter.

Prior to the opening of a laboratory at Toronto the Seed Importation Regulations were administered from Ottawa for all Eastern Canada. Samples are taken by customs officers and forwarded for examination and test, and, except in certain cases, the lots are held awaiting orders as to release, recleaning, or return to the country of origin. The quantity admitted during the past year was 8,592,944 pounds, which, with the imports at Toronto, totals 12,700,679 pounds for Eastern Canada.

SESSIONAL PAPER No. 16

Seed control regulations in most other countries have been highly developed during the past ten years. The trend of the trade in many kinds of seeds would seem to indicate that unless our seed control regulations are equivalent to those of other countries we are apt to have on our markets too much of the seed of a quality that cannot be marketed in those countries because of their higher standards and more efficient control. This matter is being carefully studied with a view to bringing our seed control system in all its phases to a level deemed to be necessary in the best interests of our seed users.

FEED DIVISION

The feeding stuffs control work conducted in accordance with the act regulating the sale and inspection of commercial feeding stuffs, bran, shorts, middlings and chop feeds, consists in the registration of the various brands to be offered for sale; the examination of feed products at points of manufacture, distribution and sale; the inspection of methods of labelling and selling; the procuring of official samples for chemical and botanical analyses to determine if the manufacturer's guarantee in respect of chemical contents and ingredients, required to be printed on containers or tags attached thereto, is correct, and whether or not vital weed seeds or deleterious materials are present in excess of the tolerated amounts; and the prosecution of those parties considered guilty of the violation of the law.

All registrations under the Feeding Stuffs Act expire on September 30 following the date of issue, but may be renewed from year to year. From January 1, 1921, at which time the Act came into effect, to September 30 of the same year, registrations were issued to 188 manufacturers covering 570 different brands of feeding stuffs. From October 1, 1921, to March 31, 1922, 193 manufacturers secured registrations on 548 different brands.

In addition to the inspection of feeds at the points of distribution and sale, particular attention has been given to inspection at the points of manufacture, since the primary requirements of the Act concern the manufacturer. Control of the sale of wheat by-products has demanded special attention and consideration. Two causes which have contributed largely to the numerous complaints from feeders during past years regarding by-products obtained in the milling of flour from wheat are: (a) the practice of adding to these products the screenings separated from the grain before milling and frequently without re-cleaning to remove mustards and other fine weed seeds, many of which are not only unpalatable but actually injurious to the health of stock, particularly young animals and (b) the gradual reduction in the general quality of mill feeds, attributable partly to improved milling methods which tend toward a more complete separation of the flour from the by-products.

Millers with a capacity flour production representing approximately 42 per cent of the total for Canada are still adding the mill run of ground screenings to their bran, while those adding screenings to shorts represent approximately 67 per cent of the Canadian capacity. Complaints from this practice during the past year have been comparatively rare, since these screenings must now be properly re-cleaned to remove mustards and other deleterious materials, and ground to destroy the vitality of weed seeds. The products, furthermore, must be registered as commercial feeding stuffs and labelled clearly to indicate the presence of screenings.

Complaints arising from the inferior quality of wheat by-products and not traceable to the screenings content are still common, and with a view to correcting this situation a special investigation of the flour milling industry in relation to its by-products was instituted. Much information and data have been collected which will facilitate a proper classification of wheat by-products and on which may be based suitable minimum standards of quality and chemical contents for each of the several classes.

On the whole, manufacturers have satisfactorily observed the provisions of the act or have promptly and willingly made the necessary adjustments to meet its

SESSIONAL PAPER No. 16

LOCAL SEED FAIRS

The subventions paid on account of local seed fairs were as follows:—

	Number	Amount
Prince Edward Island.. . . .		
Nova Scotia.. . . .	1	\$ 162 83
New Brunswick.. . . .	5	161 50
Quebec.. . . .	62	2,995 00
Ontario.. . . .	9	126 00
Manitoba.. . . .	23	1,025 48
Saskatchewan.. . . .	42	2,207 16
Alberta.. . . .	11	538 67
British Columbia.. . . .		
	156	\$7,516 64

PROVINCIAL SEED EXHIBITIONS

The following subventions were paid on account of provincial seed exhibitions:—

	Place of Exhibition	Amount
Nova Scotia.. . . .	Amherst.. . . .	\$ 600 00
New Brunswick.. . . .	Fredericton.. . . .	277 20
Quebec.. . . .	Quebec.. . . .	700 00
Ontario.. . . .	Guelph.. . . .	600 00
	Ottawa.. . . .	600 00
Manitoba.. . . .	Winnipeg.. . . .	600 00
Saskatchewan.. . . .	Saskatoon.. . . .	442 66
British Columbia.. . . .		
		\$3,819 86

By special arrangement the subvention available to British Columbia on account of field crop competitions and seed exhibitions was devoted to encouraging the production of field root and garden vegetable seeds, which, because of climatic conditions, may be grown to better advantage there than elsewhere in Canada. The expenditure for this purpose was \$2,500, an equal amount being contributed by the Provincial Department of Agriculture.

ASSISTANCE TO CANADIAN SEED GROWERS' ASSOCIATION

Financial support to the work of the Canadian Seed Growers' Association was continued during the year 1921 to the extent of \$10,000 from the Seed Branch appropriation. The last annual report of the association shows 2,702 active growers engaged in the production of registered and improved seeds.

FERTILIZER REGISTRATIONS, LICENSES TO SELL, AND ANALYSIS UNDER THE FERTILIZERS ACT

The total number of brands of fertilizer registered and filed in the division is 2,878; licenses to sell during the calendar year 1922, issued to manufacturers and importers, 519.

Twenty-six samples were taken by farmers under section 10 of the act, and analysis reported to them.

The total fees collected for registrations, licenses and analyses amounted to \$10,778.

NUMBER of Fertilizer Manufacturers and Importers, by Provinces and Foreign, who have been assigned Registrations under the Act

Alberta.. . . .	2
British Columbia.. . . .	23
Manitoba.. . . .	5
New Brunswick.. . . .	3
Nova Scotia.. . . .	14
Ontario.. . . .	33
Prince Edward Island.. . . .	2
Quebec.. . . .	19
Saskatchewan.. . . .	
Foreign.. . . .	68
Total.. . . .	169

13 GEORGE V, A. 1923

PRINCIPAL KINDS OF FERTILIZER FOR WHICH APPLICATION WAS MADE

Muriate of potash,
Sulphate of potash,
Nitrate of soda,
Sulphate of ammonia,
Acid phosphate,

Basic slag,
Tankage,
Bone meal,
Cyanimid.

Complete chemical fertilizers of different formulæ.

Complete fertilizer carrying organic nitrogen and phosphoric acid of different formulæ.

SEED PURCHASING COMMISSION

The Seed Purchasing Commission has continued to provide service without departing materially from the general plans as adopted in former years. Because of the superior quality of the 1920 oat crop in the province of Alberta and the moderate price then prevailing, about 600,000 bushels of No. 1 seed oats were purchased in March, 1921, for the purpose of holding in reserve as a protection against seed shortage for planting in the spring of 1922. It has proven to be fortunate that this supply of seed oats was available, inasmuch as large quantities have been needed for planting in Eastern Canada, which would otherwise have suffered the results of seed shortage.

It is very pleasant to be able to report that the operations of the commission have continued to be financially successful. The last consolidated balance sheet showed a very creditable net surplus sufficient to cover all operating charges, so that this commission has in no sense been a public charge and is generally recognized to have been of important service to agriculture in all parts of Canada.

Heretofore the operations of the commission have of necessity been restricted to the handling of mixed and impure varieties of seed grain, because it has been found to be quite impracticable to handle pure variety seed grain through the large interior terminal elevators. The distributing of mixed and impure variety seed, even though of superior cleanliness and vitality, very naturally has had the effect of producing a grain crop, considering it as a whole, of less value for milling or feeding as compared with the more uniform product that might be obtained from the better grades of seed grain that are pure as to variety. Negotiations are now in progress with a view to securing the co-operation of the farmers' and grain growers' co-operative organizations within each of the Prairie Provinces, so that all of the registered and extra No. 1 seed grain produced by farmers who make a specialty of seed growing will be preserved, assembled, cleaned and properly graded as to quality, in order that the Seed Purchasing Commission may have this supply for distribution in lieu of the inferior grades of seed grain.

Because of the varied climatic conditions, particularly in the Prairie Provinces, there are as a rule some considerable areas each year which because of drought, frost, hail or other causes are without seed supply and need the support and assistance of the Seed Purchasing Commission. It is believed to be advisable and more economical to maintain the nucleus of this organization to take care of such difficult seed situations when they arise than to disband the small staff of men who are experienced in this particular work.

THE MARITIME DISTRICT

The Seed Branch maintains an office at Truro, N.S., with a district inspector and clerk-stenographer. Seasonal inspectors for sub-districts are stationed at points convenient to the work in the three provinces.

SESSIONAL PAPER No. 16

SEED PRODUCTION AND SUPPLY

While production is in general a matter for provincial initiative, our officers have been co-operating with Provincial Departments of Agriculture in the encouragement of seed production through field crop competitions, local seed fairs and provincial seed exhibitions. These services are conducted by the provinces with financial support from Dominion subventions through the Seed Branch amounting to approximately half of their total cost. This branch now gives special encouragement to the organization of seed centres under this arrangement by offering a grant of \$200 for each combined seed crop and cleaned seed competition, and the services of our inspectors are available for making the bin inspection. They also act as judges at seed fairs and exhibitions, and the district inspector assists in training the provincial judges for standing crops.

The Maritime Provinces are taking advantage of these combined competitions, particularly in seed oats and potatoes. During 1921, three were held in Prince Edward Island, three in Nova Scotia, and two in New Brunswick. A seed cleaning plant has also been established at Kensington, P.E.I., and special attention is being given to the production of seed oats, potatoes, clover and timothy seed in that province.

Seed supply does not usually present many difficulties in the Maritime district, but the 1921 seed crop was short in oats and almost a failure in clover seed. Late spring frosts affected the clover, and all crops suffered from a prolonged drought in mid-summer. Owing to feed shortage many Prince Edward Island farmers, who ordinarily export large quantities of Registered or Extra No. 1 Banner seed oats, were forced to feed their 1921 oats surplus during the winter, and steps had to be taken to bring large quantities of seed oats from the prairie provinces. Local dealers were unable to cope with the situation, and arrangements were made whereby our officers co-operated with them in placing orders with our Seed Purchasing Commission, Regina. By April 30, 60,000 bushels of No. 1 seed oats were ordered from this source, and local dealers had purchased from private grain companies large quantities of Recleaned 2 C. W. commercial oats.

INSPECTION

Seed, feed and fertilizer trade inspection is heaviest during the winter and spring months. During the past year 824 visits were made to points requiring inspection; 1,062 visits were made to seed dealers, 1,259 to feed dealers and manufacturers, and the fertilizer trade was carefully checked at points of importation and distribution. Out of fourteen alleged violations of the Seed Control Act, six of the more serious offences were recommended for prosecution. There were five alleged violations of the Feeding Stuffs Act, upon some of which court action will likely be taken. An increasing number of farmers and gardeners are buying the constituents and mixing their own fertilizers.

EDUCATIONAL WORK

Considerable educational work was necessary in connection with the new Feeding Stuffs Act. Seed judging classes were also conducted at local seed fairs and at provincial short courses in agriculture. Addresses were given and literature distributed at provincial farmers' and dairymen's conventions.

QUEBEC DISTRICT

The work in Quebec is under the direction of a district inspector with headquarters and staff at Quebec city, and six permanent and seasonal inspectors stationed at suitable points in sub-districts.

SEED PRODUCTION AND SUPPLY

Field crop competitions have become very popular in the Quebec district, and excellent progress has been made in the establishment of the combined seed crop and cleaned seed competitions. Twenty-three of the latter type were held this year, with 1,043 competitors in oats, clover seed and potatoes. The district inspector assisted in training the provincial judges for the standing crops and his staff made the bin inspections of the cleaned seed. These competitions and seed fairs have resulted in a marked improvement of local seed stocks, and farmers are giving more attention in cleaning and grading.

Within the last few years this district has become practically self-sustaining in the production of general field seed supplies, but the 1921 drought played havoc with the grain crops. In the emergency, orders for seed oats were placed with our Seed Purchasing Commission totalling 136,000 bushels by the end of April, 1922. The quality of the clover seed crop was generally good, and local oats, while light in weight, showed good vitality. Imported oats from the grain trade are usually tagged to indicate the noxious weed seeds present instead of being cleaned to seed grade standards. In the past many complaints have been received from farmers as to the quality of tagged seed, but the competition of No. 1 seed oats from the Seed Purchasing Commission is gradually forcing seed merchants to deal only in good seed oats.

INSPECTION

Feed and fertilizer inspection requires special attention in Quebec. Feeding stuffs offered there too frequently contain mill sweepings, oat hulls and dirt, and the province appears to have been made a dumping ground for low-grade fertilizers. However, a number of prosecutions now pending may tend to improve the situation. Over a hundred samples of feeding stuffs were taken for analysis and practically all kinds of fertilizers offered for sale have been checked for comparison with registration samples. Visits were made to 904 points requiring inspection, 2,199 to seed dealers, 1,196 to feed dealers, and 109 to fertilizer dealers and manufacturers.

EDUCATIONAL WORK

Our inspectional and educational work is causing the farmers to study the analysis of seed, feed and fertilizer before purchasing. Too much attention had been given to the low-priced products which in actual value would figure from analysis to be more expensive than many high-priced products. Farmers had been purchasing material sold as fertilizer which was practically worthless.

EASTERN ONTARIO

A district inspector, with headquarters at Ottawa, and four permanent and seasonal inspectors cover the work in eastern and northern Ontario, Wright and Pontiac counties, Quebec.

SEED PRODUCTION AND SUPPLY

The clay belt of northern Ontario is becoming an important region for the production of red clover and alsike seed. The 1920 crop at Oxdrift and the Slate River valley amounted to over 6,000 bushels, but last year was unfavourable and the yield was only about one-third of normal. The industry is well organized through the Kenora Seed Growers' Association, and marketing is done on the carlot basis. The growing of garden peas and other seed crops for the canning industry has assumed large proportions in eastern Ontario.

SESSIONAL PAPER No. 16

There was an unusually early harvest in 1921 and the grain crops were the lightest ever experienced. However, large quantities of good oats had been carried over by the farmers and helped to prevent a shortage for this year. Dealers brought in No. 2 C.W. commercial oats from Western Canada and recleaned them for seed, but a better quality of seed oats of the No. 1 seed grade was obtained from our Seed Purchasing Commission. Farmers in this district obtain many of their seed supplies, especially clover seeds, direct from other farmers rather than through the seed trade. There is very little demand for the No. 3 grades, and most farmers require No. 1.

INSPECTION

Points requiring inspection received 1,725 visits; 1,553 were made to seed dealers, 1,808 to feed dealers and manufacturers, and the fertilizer trade was given necessary attention. Three prosecutions were successfully conducted under the Seed Control Act, and others are pending under the Feeding Stuffs Act.

EDUCATIONAL WORK

The district inspector conducted short courses in seed judging, gave addresses before farmers' clubs and seed meetings, judged at exhibitions and seed fairs, and with his staff did the judging in the bins under the combined competitions.

WESTERN ONTARIO

The field staff in western Ontario includes a district inspector and four or five permanent and seasonal inspectors. The opening of a seed and feed laboratory at Toronto has greatly facilitated the work of inspection in this district.

SEED PRODUCTION AND SUPPLY

This is one of the best seed producing districts in Canada, but the 1921 seed crops were generally light in yield and only fair in quality. Dealers who usually ship a number of cars of the clover seeds reported business last year in a few hundred bushels. The situation was further aggravated by a lack of export demand and low prices. The fibre flax seed crop for export to Ireland amounted to only 7,200 bushels of No. 1 seed grade.

Seed corn yields were very satisfactory and there was a plentiful supply of the No. 1 grade to meet Canadian demands. A shortage in seed oats was prevented by the Seed Purchasing Commission, which had Ontario orders for 98,000 bushels to the end of April. Farmers had also carried over supplies from the 1920 crop. There was a scarcity of No. 1 red clover seed owing to the poor season and an increased demand for the No. 2. The administration of the Seed Importation Regulations for western Ontario was taken over by the Toronto inspection office early in February, and 4,107,735 pounds were released from customs for the last two months of the fiscal year.

INSPECTION

Six prosecutions were conducted under the Seed Control Act for the 1921 trade season. Over 1,200 visits were made to seed dealers, 800 to feed dealers, 20 to fertilizer manufacturers, and 670 to points requiring inspection. Feed manufacturers and dealers were doing their best to comply with the new Feeding Stuffs Act, and only a few violations were reported. The fertilizer trade was also in a good condition.

EDUCATIONAL WORK

The district inspector supervised the seed department of the Guelph Winter Fair and judged at the Ottawa Winter Fair and the Chatham Corn Show. He also took an active part in the meetings of the Western Ontario Seed Growers' Association.

MANITOBA AND SASKATCHEWAN

This district is served by an inspection office and seed and feed laboratory at Winnipeg. A district inspector and six seasonal inspectors control the trade with a seed inspector at each of the Canadian Government elevators at Moosejaw and Saskatoon.

SEED PRODUCTION AND SUPPLY

The grain crops last year were a good average, but the quality was injured by hot, dry weather during the filling period and a very wet harvest. There was also an excess of saw-fly damage, particularly in the dry areas of southwestern Manitoba and southern Saskatchewan. Rust did considerable injury in the northern districts. Brome and western rye grass seeds are produced in quantity and attention is given to sweet clover and golden millet.

Seed grain available through the Government elevators was not up to the quality of 1920 which had been carried over by the Seed Purchasing Commission, and weighed out fifty pounds to the bushel in many cases. Large quantities of Durum wheat were purchased for southern Saskatchewan and rye was in demand for the rust districts. Importations through customs under our seed regulations totalled 2,213,200 pounds for all kinds of seed.

INSPECTION

The inspection of seed grain at the Canadian Government interior terminal elevators is made available to the general trade but has been used principally by the Seed Purchasing Commission. Grain which can be cleaned to seed with a reasonable dockage is separately binned according to the grade, and certificates issued with warehouse receipt for the shippers. When ordered out it is cleaned to seed grain and each shipment is covered by an ex-elevator seed certificate attached to the bill of lading. For the season ending April, 1922, approximately 18,000 bushels of seed wheat, 100,000 bushels of seed oats and 1,000 bushels of seed barley were inspected out of the Moose Jaw and Saskatchewan elevators.

Points requiring inspection received 537 visits; 876 were made to seed dealers, 896 to feed dealers and 12 to the fertilizer trade, which is practically nil in this district. Fifteen prosecutions under the Seed Control Act were conducted on the 1921 seed season, and a few court actions are assured on the 1922 feed season. Special attention was given to the quality of recleaned grain screenings obtained from the elevators. The quality of mill feeds is reported as materially improved as a result of the new Act.

EDUCATIONAL WORK

Inspectors were enabled to cover new territory last season and were generally welcomed as a source of information to dealers and farmers. The district inspector is a member of the Saskatchewan Seed Board and co-operates with provincial officers in promoting seed production. He judged at the Saskatoon Seed Fair and gave an address on the combined competitions before a conference of agronomists and district representatives at the Manitoba Agricultural College.

ALBERTA AND BRITISH COLUMBIA

The organization in this district includes an inspection office and a seed and feed laboratory at Calgary. The trade is controlled by a district inspector, five seasonal inspectors, and a permanent inspector who is also a seed production specialist in British Columbia.

SESSIONAL PAPER No. 16

SEED PRODUCTION AND SUPPLY

Field root and garden vegetable seed production was developed in British Columbia during the war years of threatened seed shortage, and reached in quantity approximately 150,000 pounds for the year 1919. While production has fallen off since, owing to heavy seed crops in Europe and changed economic conditions there, the Saanich peninsula, the Gulf islands and the Lower Fraser valley have soil and climatic conditions which are bound to make them important seed producing centres in North America. Sugar beet and onion seed were the principal crops last year. A grower at Salt Spring had 55 acres of flower and vegetable seeds. About 60 acres were devoted to sweet pea seed, principally around Victoria, at Royal Oak and Duncan, and mostly under contract with British seedsmen at profitable prices to the growers.

Very satisfactory progress is being made in alfalfa seed growing at Brooks, Alta., and in the Lytton and Ashcroft districts, B.C. Approximately 8,000 pounds of the Brooks Grimm alfalfa graded No. 1 and received registration by the Canadian Seed Growers' Association; 25,000 pounds did not reach this standard because of excessive weed seeds, principally Russian thistle.

The British Columbia seed crop in the districts mentioned comprised over 27,000 pounds and was mostly the common alfalfa. This seed crop is proving successful sixty miles north of Edmonton, where a grower harvested 6,000 pounds from twelve acres. The importation of over 30,000 pounds of Grimm alfalfa from Idaho will result in more extensive operations for 1922.

Timothy seed has proven to be a very suitable crop for southern Alberta, the Peace River district and the Bulkley valley, B. C. Last year's crop in southern Alberta suffered seriously from the dry weather, but conditions promise to be generally favourable in the other districts. A Peace River grower had 800 bushels of excellent seed and the acreage there is being doubled this year.

Large quantities of seed grain were required for southern Alberta, which had not yielded the return of seed sown in many districts. The grain on spring ploughing and on stubble was practically a failure. Inspections of wheat at the Calgary elevator indicated that the quality and purity of variety were generally inferior as compared with former years. The oat crop was a heavy one in northern Alberta, but frost caused serious injury. All demands were, however, met from the 1920 surplus carried over by the Seed Purchasing Commission at the Calgary elevator. Ex-elevator inspections for the season ending April totalled 27,764 bushels of seed wheat, 478,290 bushels of seed oats and 1,040 bushels of seed barley. The commission distributed in Western Canada for the same period 158,600 bushels of oats from the Calgary, Moose Jaw and Saskatoon elevators, but most of their supply went to Eastern Canada. Importations through customs totalled 583,685 pounds of seed.

INSPECTION

Over 500 visits were made to points requiring inspection, 324 to seed dealers, 475 to feed dealers, and 90 to fertilizer dealers and manufacturers. Three prosecutions were conducted under the Seed Control Act during 1921. A careful inspection of all feed manufacturers revealed a number of departures from the requirements of the Feeding Stuffs Act, particularly in regard to the details of labelling. Fertilizer inspection was handicapped somewhat by pressure of work at the Vancouver laboratory of the Department of Health.

EDUCATIONAL WORK

The district inspector took an active part in the proceedings of the Alberta Seed Board, which has charge of seed production work in the province. He judged at the Provincial Seed Exhibition and at local seed fairs in Alberta and British

13 GEORGE V, A. 1922

Columbia. An exhibit was made at the New Westminster Fair, displaying the various steps in field root and vegetable seed production. Addresses were given before the Dairymen's Convention at Victoria on feeding stuffs regulations, and before the Vernon Irrigation Convention on alfalfa seed production.

THE COPENHAGEN CONGRESS

In response to a communication received from the British Colonial Secretary the Seed Commissioner was duly appointed the delegate from Canada to attend, with the British delegation, the International Congress on Seed Control held at Copenhagen during the week ending June 10, 1921. He also represented the Association of Official Seed Analysts of North America, of which he was president for the year.

These international organizations exist for the purpose of unifying systems of seed control and providing an acceptable basis for adjusting disputes that may arise in connection with international shipments of grass, clover and other seeds. Canadian seed producers and merchants were vitally interested in the proceedings of the European congress at Copenhagen, inasmuch as probably eighty per cent or more of the alsike seed supplies of Europe are as a rule obtained from Canada. The need for maintaining a high standard of efficiency in seed control work is becoming better appreciated by our own farmers. The need for maintaining a staff of competent analysts in direct charge of our seed laboratories will appear obvious when it is understood that each seed control station may or may not be deemed competent to adjust disputes that may arise from international shipments of seed supplies, depending on whether or not the staff in charge of the station is judged competent by the international associations.

A great deal of valuable information grew out of the conference at Copenhagen, and this has formed a subject for report of much interest, particularly to the technical officers of the department and of the American association.

Acting under instructions the Seed Commissioner visited a large number of important seed producing centres, feed control laboratories and fertilizer manufacturing establishments in Denmark, Sweden, Germany, Holland, France, England and Scotland. A new and comprehensive fertilizer bill has been prepared which contains several important features that have grown out of experience in fertilizer control particularly in Scotland.

Six lots of special stock seed of white clover and orchard grass varieties were selected for importation and production in Canada with a view to exporting to those countries where these seeds are in popular demand.

In addition to his regular departmental work the Commissioner, at the request of the Minister, represented the Canadian Department of Agriculture at the Intercolonial Conference of the British Empire Producers' Organization, held in London on July 14-15, 1921.

ENTOMOLOGICAL BRANCH

The work of this branch has been continued along somewhat similar lines as that of recent years. Important savings to crops have resulted from advice given to farmers, fruit growers, etc., by our officers. The established field laboratories in the various provinces are being more and more recognized as reliable sources of information regarding the control of injurious insects. In addition to the Administrative Division, the work of the branch is conducted chiefly by the Division of Forest Insects, the Division of Field Crop and Garden Insects, the Division of Foreign Pests Suppression and the Division of Systematic Entomology.

Under the direction of the Dominion Entomologist the Regulations under the Destructive Insect and Pest Act have been administered in so far as they

SESSIONAL PAPER No. 16

refer to insect pests. The following amendments to the regulations referring to insects were passed during the fiscal year April 1, 1921, to March 31, 1922:—

By Order in Council passed on May 12, 1921 the amendment passed on May 24, 1920, which dealt with the importation of certain plant products from the areas in the United States infested with the European corn borer was rescinded. The new amendment included the territory recently found infested by the pest and permitted the entry of certain products without certificates of inspection between January 1 and June 1.

On May 18, 1921, the Ministerial Order passed on November 19, 1920, quarantining certain areas in the province of Ontario on account of the European corn borer, was rescinded and replaced by an Order in Council passed on the same date. The Order in Council extended the quarantine to include certain sections bordering the quarantined area in which canning factories were located. This was done so as to enable farmers living in the quarantined area to dispose of their crop at the canning plants.

On August 26, 1921, a Ministerial Order was passed which extended the area quarantined for the European corn borer in southern Ontario, to include the townships found infested by the pest from August 1 to the above date.

On September 7, 1921, a Ministerial Order was passed which extended the area quarantined for the European corn borer in southern Ontario, to include the additional townships found infested by the pest from August 26, to September 7.

On October 3, 1921, a Ministerial Order was passed which extended the area quarantined for the European corn borer in southern Ontario, to include the additional townships found infested by the pest from September 7 until the end of the scouting season.

On November 15, 1921, a Ministerial Order was passed which extended the area quarantined for the apple sucker in the province of Nova Scotia, to include the county of Halifax, the pest having been found in this county during the preceding summer by the inspectors.

On February 7, 1922, an Order in Council was passed which added the following insect pests to the list of pests to which the regulations shall apply: Japanese beetle, Mexican bean beetle, sweet potato weevil, satin moth, currant gall mite, and the hazel blister mites.

On February 10, 1922, the Order in Council passed on May 18, 1921, and the Ministerial Orders passed on August 26, 1921, September 7, 1921, and October 3, 1921, quarantining certain areas in the province of Ontario on account of the European corn borer were rescinded. These were replaced by an Order in Council which included all the amendments to the previous Order and brought the quarantine up to date.

By Order in Council passed on March 21, 1922 (P.C. 591), the amendment dealing with the importation of certain plant products on account of the European corn borer, passed on May 12, 1921, was rescinded. The new amendment restricted the importation of certain plant products from all the areas found infested by the European corn borer in the United States.

By Order in Council passed on March 21, 1922 (P.C. 593), the amendment dealing with the importation of alfalfa hay, on account of the alfalfa weevil, passed on April 14, 1920, was rescinded. The new amendment places an embargo on the importation of alfalfa hay from all areas in the United States infested with the alfalfa weevil. It also requires that all shipments of alfalfa hay consigned to the Prairie Provinces and British Columbia be accompanied by a certificate stating the county and state in which it was grown.

DIVISION OF FOREST INSECTS

The work of the officers of this division has included investigations of bark-beetle outbreaks in pine and Douglas fir in British Columbia; eastern spruce bark-beetle outbreaks in the Gaspé region of Quebec; spruce budworm and beetle injury to balsam and spruce in Eastern Canada; shade tree insect outbreaks, and forest sample plot studies.

The control of bark-beetle outbreaks in yellow pine has been carried out successfully in the Nicola district of British Columbia by the Dominion and Provincial Forest Branches under the supervision of our officers. It is evident that a very large quantity of timber threatened with destruction by the outbreak has been saved by this control operation. It is hoped that this work will be extended this season to cover additional infested territory.

An outbreak by the eastern spruce bark-beetle was investigated by our officers and control measures were recommended. A considerable amount of timber has already been killed by the beetles, but modified logging operations will prevent further spread of the disease.

Our investigations of the spruce budworm injury to balsam and spruce in Eastern Canada have been continued. The active budworm outbreak has disappeared throughout the greater part of Quebec and New Brunswick, but the weakened balsam is still dying in many places through attack by bark-boring beetles and fungi. An active budworm outbreak is in progress in the Temiskaming district of Quebec extending westward as far as lake Temagami in Ontario. The loss caused to our forests by the spruce budworm and the beetles which followed it has been estimated by our officers at more than fifty per cent of the total balsam stand in Eastern Canada. Recommendations for alleviating the present situation and preventing a similar outbreak in the future are being perfected. They include utilization of dead, dying and mature balsam, proper disposal of beetle-infested trees, slash disposal, and proper system of forest management suitable to development of budworm immune types of forest. Our officers, with the co-operation of the Air Board, carried out a further aerial survey of the budworm injured areas of western Quebec, and obtained valuable information.

The forest sample plot studies were continued according to the previous plans; several additional plots being established in New Brunswick.

Investigations of various shade tree insects, and the biology of various forest insects have been conducted chiefly at the forest insect laboratory near Aylmer, Que.

DIVISION OF FOREIGN PESTS SUPPRESSION

The inspection of imported nursery stock and the conducting of such other work necessary under the regulations of the Destructive Insect and Pest Act, has occupied the time of the officers of this division.

During the year the brown tail moth suppression work was continued in the provinces of New Brunswick and Nova Scotia. No nests were found during the scouting season in the former province. In Nova Scotia between December 1, 1921, and March 25, 1922, 977 nests were collected. Most of these were taken in the following localities: Bridgetown, Torbrook, Round Hill, and Wolfville. This represents an increase over the number of nests collected the preceding year.

The scouting for the European corn borer carried on during the summer of 1921 in the province of Ontario, showed that this insect had spread over a large amount of territory. One hundred and six townships covering 8,214 square miles are now quarantined for this pest. On July 21, the United States Department of Agriculture placed an embargo on the province of Ontario on account of the European corn borer and required that certain products be inspected before entry into the United States. From the above date to December 31, 430 certificates were issued for export shipments. The value of the products exported approximated twenty-five thousand dollars.

SESSIONAL PAPER No. 16

The quarantine for the apple sucker in the province of Nova Scotia was maintained during the year. The total area now infested covers 2,249 square miles. Five hundred and seventeen certificates and permits for 42,934 plants were issued under this quarantine during the year.

The inspection and fumigation of nursery stock imported into Canada in accordance with the Regulations under the Destructive Insect and Pest Act was continued. For the year ending March 31, 1921, 1,218,702 plants from Europe, Japan and the New England states were inspected; and 19 carloads, 768 cases, 647 bales and 780 parcels of nursery stock from the United States and Japan were fumigated at the Dominion fumigation stations. The value of the plants, trees, shrubs, vines and florists' stock, but not including cut flowers, imported into Canada for the fiscal year mentioned above, was \$841,691.

A report to the effect that the gipsy moth was present in the Maritime provinces was carefully investigated and the suspected areas thoroughly scouted, but no sign of the pest was found.

DIVISION OF FIELD CROP AND GARDEN INSECTS

As mentioned in the report for the year ending March 31, 1921, the European corn borer was discovered in Ontario by the officers of the branch in August, 1920. Since then further intensive scouting work has revealed the fact that this dreaded enemy of corn has become firmly established particularly in Middlesex and Elgin counties. During 1921 important progress was made in studying the life-history of this insect under Ontario conditions and much data secured of value in devising control measures. Information regarding this pest and its destructive habits was given wide publicity. In districts to the south of St. Thomas considerable injury took place not only to sweet corn, but also to dent corn and to flint corn.

In the Prairie Provinces important outbreaks of grasshoppers and cutworms were investigated and much crop saved resulting from information given by our entomologists.

Further biological studies of such important insects as the western wheat-stem sawfly, the cabbage and onion maggots, the corn-ear worm, the Hessian fly and other grain-infesting insects, have been made. The infestation of the western wheat-stem sawfly in Manitoba alone, has been estimated to extend over an area of 8,000 square miles, the actual crop affected in 1921 exceeding one million acres. Important losses have also taken place in Saskatchewan. In the province of Alberta, the pale western cutworm has developed into a pest of first importance. Much experimental control work has been accomplished and progress made. A new method of poisoning the adult moths before they lay their eggs has been devised. In 1921 one of the most important outbreaks of the corn-ear worm, of which we have record, occurred throughout Canada. In some sections of Ontario late sweet corn was injured in some fields to the extent of 25 per cent of the crop.

DIVISION OF SYSTEMATIC ENTOMOLOGY

The officer in charge of this division has continued important systematic studies of insects in the National Collection. During recent years this collection of insects has been added to very considerably from collections made in various parts of Canada by our own officers and outside entomologists, in addition to which collections have been received by request or purchase. Among the more important collections added to the National Collection during the year was the collection of aculeata hymenoptera belonging to the late F. W. L. Sladen, Dominion Apiarist.

The National Collection of Insects is the most important collection in Canada and is becoming recognized as one of the major collections in North America. It is

attracting the attention of entomologists from many provinces and states and its value to the economic worker cannot be too highly emphasized. It is essential that officers know the names of the insects they find causing damage to orchard, field or forest crop, and this is only possible by systematic studies of the species themselves and a search in the literature of the systematist.

During the year, many specimens of insects have been determined for entomologists, other than those in the employ of the department, as well as for teachers and others.

Important progress has been made in systematic studies of such important insects as the Tabanidae (horse flies); Micro-lepidoptera (leaf-rollers, etc.), leaf-eating coleoptera, etc.

INSECTICIDE INVESTIGATIONS

During the year our insecticide entomologists have made valuable progress in the development of more efficient and cheaper insecticides. The value of copper arsenic dusts for orchards, devised by our officers, is now becoming more widely recognized. Further progress was made in 1921. The reduced cost of dust mixtures will result in important savings to fruit growers and others. In Western Canada the value of white arsenic and arsenate of lime, as insecticides to take the place of more expensive and widely adopted arsenicals, was demonstrated.

NATURAL CONTROL INVESTIGATIONS

In the Maritime provinces, particularly in Nova Scotia, important studies of diseases affecting such pests as the apple sucker, recently introduced into Canada from Europe, and the green apple bug, have been made by one of our entomologists. Other natural control investigations undertaken refer particularly to agencies responsible for controlling the forest tent caterpillar and the spruce budworm. In British Columbia a predacious mite introduced a few years ago to control the oyster shell scale, an important pest which has established itself near certain fruit sections in the Okanagan, is increasing in abundance and it is expected will render valuable service.

STORED PRODUCT INSECT INVESTIGATIONS

Very few complaints of insects infesting stored products were received during the year. Larvæ of the carpet beetle were in one instance reported to be damaging flour bags. Correspondence showed that the raw material obtained by the manufacturers of bags is frequently infested by these larvæ and that the bag factories may be a source of infestation to flour and other mills. Preliminary life-history studies were made in connection with an undetermined tarsonemid mite which is very common in some of the grain elevators.

MOSQUITO INVESTIGATIONS

The officer in charge of the mosquito investigations continued this work in 1921 in the neighbourhood of Mission, B.C. Extensive surveys were made of flooded areas in the Fraser River valley and much information gained not only regarding the control of these insects over such a wide area, but also on their life-history and habits.

INDIAN ORCHARD WORK

The supervisor of Indian orchards in British Columbia, an officer of the Department of Indian Affairs, continued to act as supervisor in 1921 under the direction of the Dominion Entomologist. The reports received from this officer indicate that excellent progress was made by the Indians of the province in horticulture and agriculture.

SESSIONAL PAPER No. 16

ADVISORY BOARD ON WILD LIFE

The Dominion Entomologist, as the representative of the Department on the Advisory Board on Wild Life Protection, has attended the meetings of the board during the year. This board is an interdepartmental one in charge of matters relating to the protection of fur-bearing and big game animals, wild fowl and other animal life.

FIELD LABORATORIES

Annapolis Royal, N.S.—The officers attached to this laboratory have been continuing insect investigations and many experiments with dust and spray mixtures have been developed, particularly in the Annapolis valley. Experiments with new insecticides were also carried out in New Brunswick. One of the officers of this laboratory visited Western Canada to assist in the development of poisoned baits for the destruction of grasshoppers. Some further experiments were also conducted in Manitoba in connection with gopher control.

Fredericton, N.B.—The natural control studies of such well known pests as the spruce budworm, tent caterpillar, fall webworm, green apple bug, apple sucker, etc., have been conducted from this laboratory. The officer in charge of this laboratory has also made a survey of the province for information regarding the damage caused by the spruce budworm. In the province of New Brunswick a severe outbreak of the tent caterpillar occurred and from information secured by our officers this outbreak will continue in 1922. Other insects which were present in destructive numbers were the Colorado potato beetle, the larch case-bearer, the larch sawfly, etc.

Hemmingford, P.Q.—In the province of Quebec, the officer in charge of this laboratory has conducted further experiments in orchard spraying and dusting, and considerable progress has been made in this work. It is of interest to record that some of the best fruit grown in the district was from orchards which had been used for demonstration work. Among the insects which have been specially studied by the officer in charge of this laboratory are the following: the apple maggot, tent caterpillar, plum curculio, apple curculio, cutworms, etc.

Vineland Station, Ont.—Fruit insects were specially studied from this laboratory during the year. Investigations were continued on the pear psylla, potato leaf hopper, strawberry weevil, blackberry leaf miner, etc., and much valuable data was secured. Experiments with dust and liquid spray mixtures were conducted in apple, cherry, plum and peach orchards. Other work begun at this laboratory referred to studies of the grape leaf hopper, rose chafer, green apple bug, peach tree borer, pear aphid and nematodes.

Strathroy, Ont.—The studies of the Hessian fly outbreak were conducted at this laboratory as well as studies relating to the biology and control of the potato leaf hopper, potato beetle and European corn borer. Some further work was effected on the white grub.

Port Stanley, Ont.—A laboratory was established at this point during the year for the purpose of studying especially the outbreak of the European corn borer in western Ontario. This laboratory also serves as a headquarters for the men engaged in the quarantine work necessary on account of the establishment of this insect in Canada.

Treesbank, Man.—The officer in charge of this laboratory has again assisted considerably in the outbreak of grasshoppers which has been present in this province. Many meetings of farmers were attended and instructions given as to the proper method of

control of these destructive insects. A study of the western wheat-stem sawfly was conducted and much information of value obtained. Other insects which required attention in the province were: the Colorado beetle, cucumber flea beetle, beet webworm, red turnip beetle, wireworms, etc.

Saskatoon, Sask.—This laboratory was under the charge of a temporary officer during the year and investigations on the biology of black flies, horse flies, etc., were conducted. Assistance was also rendered from this laboratory in connection with outbreaks of the beet webworm, grasshoppers, cutworms, etc.

Lethbridge, Alta.—The outbreak of grasshoppers in the province of Alberta required constant attention from the entomologist in charge of this laboratory. The pale western cutworm, a very destructive species, caused considerable damage, and further studies of this pest were made. Important control measures were developed. Other insects which caused damage in the province were the beet webworm, wheat-stem sawfly, thrips on alfalfa, wireworms, flea beetles, etc.

Vernon, Agassiz, Victoria, B.C.—The chief entomological laboratory in British Columbia is located at Vernon, and from this laboratory insects attacking orchard trees in the Okanagan were studied, particularly those affecting the apple. Further co-operative work was also carried on in connection with the control of root maggots, which are an important enemy of the market gardener. At this laboratory an important representative collection of the destructive insects of the province is being brought together.

At the Agassiz laboratory investigations relating particularly to small fruit insects were continued. Further observations were made by the officer in charge of this laboratory on the satin moth, a recent importation into British Columbia which has spread rather considerably during the year and has now been found in Vancouver and on Vancouver island near Duncan's.

At the Victoria laboratory the control of the strawberry weevil has been further developed by the adoption of weevil-proof barriers. Biological studies have also been made on the leaf hopper which attacks the loganberry, the raspberry cane girdler, the western ten-lined june beetle, etc.

PUBLICATIONS

The following publications have been issued from the Entomological Branch during the year:—

CROP PROTECTION LEAFLETS

No. 15.—The Pale Western Cutworm. By H. L. Seamans and E. H. Strickland.

No. 16.—The Control of the European Corn Borer. By H. G. Crawford and J. G. Spencer.

CIRCULARS

No. 9.—Common Garden Insects and their Control. By Arthur Gibson. (Reprinted.)

No. 15.—The Control of Bark-beetle Outbreaks in British Columbia. By Ralph Hopping.

In addition to the above departmental publications the officers of the branch have contributed articles in the *Agricultural Gazette of Canada* as well as in entomological journals such as *The Canadian Entomologist*, transactions of various societies, etc. Many articles were also prepared by our entomologists for the agricultural press.

SESSIONAL PAPER No. 16

FRUIT BRANCH

THE FRUIT SEASON

All bushes and trees came through the unusually mild winter in excellent condition, and the favourable warm weather of an exceptionally early spring, together with a most profuse bloom throughout all the fruit districts of the Dominion, tended to forecast a prosperous season. The favourable winter conditions, however, were followed in the late spring and summer by a most severe drought which caused the fruit season of 1921 to be, from the cultural standpoint at least, one of the most unfavourable in a number of years.

The commercial apple crop of the Dominion was approximately 15 per cent larger than that of 1920, or 3,771,100 barrels as compared with 3,382,540 barrels. In British Columbia growing conditions were particularly satisfactory throughout the season, with the result that a crop at least 100 per cent in excess of 1920, or 3,027,000 boxes as compared with 1,512,620 boxes, was produced. In Ontario the crop was but 60 per cent of that of 1920, or 960,000 barrels as compared with 1,600,000 barrels. This decrease was due in part to a further deterioration of the trees as a result of the 1917-18 freezing, but largely to a series of severe frosts at blossoming time followed by continued dry weather. In Quebec the crop was reduced to about 40 per cent of 1920, or 35,200 barrels as compared with 88,000 barrels, due principally to the extreme drought prevailing throughout the season and to severe windstorms just before harvest time. The apple crop in New Brunswick was 10 per cent in excess of that of 1920, or 33,000 barrels compared with 30,000 barrels. Nova Scotia produced an apple crop of 1,837,140 barrels, which was one of the largest in its history and exceeded the 1920 crop by 677,140 barrels. This crop was the third successive large crop for this province.

In spite of the generally unsettled conditions in Great Britain and the consequent reduced buying power a greater quantity of apples was exported than for a number of years. There were exported from Nova Scotia alone 1,111,827 barrels and 6,494 boxes, at prices which gave the grower a very satisfactory return.

The apple market in Canada was unusual in that equal grades of apples in barrels gave larger returns to the grower than did those packed in boxes. This condition was due largely to the fact that British Columbia, the largest box packing province, had a bumper crop which it was unable to place on its usual market, the Prairie Provinces. This necessitated many long haul shipments to points in Eastern Canada and the United States under very heavy transportation charges which resulted in lower prices to the grower. A large portion of the apples produced in Ontario, Quebec and New Brunswick found a ready profitable market at home.

The small fruit crop in British Columbia was approximately 100 per cent in excess of the crop of 1920, but in view of the extreme heat, under which the fruit matured very rapidly, and the reduced demand, the returns to the grower were not equal to those of the previous few years. In Ontario the small fruit crop was not up to average, due largely to the dry hot weather, and to a blight which attacked the leaves. Prices in general were lower than for some seasons.

In British Columbia the crop of peaches, plums and prunes, was equal to that of 1919, while pears yielded only about 75 per cent of the 1920 crop due largely to the severe attacks of fire blight. The tender fruit crop in Ontario was light. The pear crop was equal to that of 1920, but peaches both of the early and late varieties did not yield more than 40 per cent of the previous year. The plum crop was about 50 per cent of average, while that of cherries was but 20 per cent of the 1920 crop.

CROP REPORTS

The Fruit and Vegetable Crop Report was issued each month from June to October, inclusive, as usual. Each report gave, in addition to a summary of the

13 GEORGE V, A. 1923

crop conditions and prospects prevailing for the period in each province, a detailed statement from each separate district in each province. It also included a statement on the condition of the crops in the United States and Great Britain. The opportunity was taken of bringing to the attention of the fruit and vegetable growers of the Dominion various outstanding points of interest to them, such as new regulations, the Imperial Fruit Show regulations, and matters affecting the transportation of their products. A special potato Crop Report was issued in November. It is evident that the Fruit and Vegetable Crop Reports are satisfying a demand for information of the nature contained therein, and the mailing list now contains approximately 10,000 names each of which represents a definite request.

TELEGRAPHIC MARKET REPORTS

The publication of the Telegraphic Market Report on the conditions and prices obtaining in the principal Canadian markets was commenced earlier than usual due to the fact that the season in general was almost two weeks earlier than normal. The first report was published on August 22, simultaneously at Vancouver, B.C., Winnipeg, Man., Ottawa, Ont., and Middleton, N.S., and twice weekly thereafter until December 29. From that date until March 31 the reports were published once per week at Ottawa only. The Telegraphic Market Reports published at Vancouver were distributed to 500 applicants in British Columbia, those printed at Winnipeg to 400 on the Prairie Provinces, those at Ottawa to 1,500 in Ontario and Quebec and those at Middleton to 600 throughout the Maritime Provinces.

Through the generous co-operation of the United States Bureau of Markets and Crop Estimates reports were also published of market conditions and prices obtaining in United States markets which were of special interest to Canadian growers and shippers. This service is gratefully acknowledged.

As usual the prices prevailing on the various European markets to which Canadian shipments are made were cabled immediately following each sale, by the Canadian Fruit Trade Commissioner. During the past season the prices received in English and foreign exchange were converted in this office at the prevailing rate of exchange to dollars and cents, and published as such. The mailing list for this report has grown by individual requests from 2,700 in 1920 to 3,000 during the past season.

TRANSPORTATION

To develop a proper system of distribution for Canadian fruits and vegetables it is necessary to cultivate co-operation between shippers and carriers and between the individual transportation companies. That is to say, traffic arrangements between companies, whereby the marketing of these commodities is expedited, becomes necessary to a greater extent owing to their perishable nature than is applicable to any other class of traffic. This condition is gradually being brought about through the activities of our Transportation Division by analyzing the problems arising between the shipper and carrier, by co-operating in matters of investigation and by developing the best possible service on a satisfactory basis without discrimination.

Frequent conferences were held during the year with railway, express and steamship officials, resulting in satisfactory rate adjustments, improved loading and unloading conditions, more favourable routings, storage-in-transit privileges, establishment of commodity rates from new districts and extension of markets under special rates, erection of shelters at shipping points, construction of sidings, better terminal facilities, improved icing facilities and conditions, improvements in car construction and tariff amendments which were in the general interest of the fruit and vegetable industries.

SESSIONAL PAPER No. 16

Several complaints submitted to the Board of Railway Commissioners by shippers were investigated and satisfactory adjustments made without the necessity of a public hearing. Our traffic and operating matters were satisfactorily handled in co-operation with officials of the Board of Railway Commissioners.

Further experiments were made during the season in handling tender fruit shipments under refrigeration. This work, which was begun in 1920 from British Columbia points, was confined to Ontario in 1921. As a result the carriers are altering the interior construction of cars to conform with our recommendations.

Meetings were attended and addresses made by the transportation specialist at different points in British Columbia, the prairies and Ontario.

IMPERIAL FRUIT SHOW

The first commercial fruit exhibition held in the United Kingdom, was projected and financed by the *Daily Mail*, London, Eng., and was held at the Crystal Palace, London, from October 28 to November 5, 1921. Special classes were provided for exhibits from the various fruit sections in the United Kingdom; also from the overseas dominions. There was also one class open to all fruit growers and associations of growers in the British Empire.

Canada was well represented in both the Overseas and British Empire sections, and in the latter section, in addition to winning many valuable prizes was awarded the grand challenge cup valued at £100 for the highest aggregate of points.

Commercial and artistic displays were also made in the non-competitive sections by the Provincial Governments of Nova Scotia and Ontario, and by the Fruit Branch of the Dominion Department of Agriculture.

The exhibition from the standpoint of advertising the excellent quality of Canadian-grown apples, was well worth the time and expense of those who participated.

The Fruit Commissioner, at the request of the management, acted as secretary for Canada, receiving entries and fees.

Tentative arrangements have been made for holding another show at approximately the same time and place in 1922. The Fruit Commissioner has again been asked to accept the position of secretary for Canada, and it is hoped that Canadian growers and associations of growers will again take advantage of this excellent opportunity to advertise Canadian apples.

EXPORT MARKETS

Arrangements have been made with the Department of Trade and Commerce whereby Mr. J. Forsyth Smith, Canadian Fruit Trade Commissioner in the United Kingdom, will again visit Canada during the summer of 1922. A series of meetings will be arranged by the Fruit Branch in co-operation with the Provincial Departments of Agriculture and provincial fruit growers' associations in all fruit growing provinces, in order that fruit growers may have an opportunity of obtaining first-hand information with respect to export markets in the United Kingdom.

The Fruit Trade Commissioner before sailing for Canada, will visit Scandinavia for the purpose of investigating the possibilities of extending the markets for Canadian fruit. Arrangements have also been made with the Department of Trade and Commerce whereby the Fruit Trade Commissioner will investigate other foreign markets at the earliest possible opportunity.

DOMINION FRUIT CONFERENCE

At the request of the several fruit growers' associations of the various provinces and of organized industries allied with that of fruit growing in Canada, a fruit conference was held in Ottawa, February 22, 23 and 24. Similar conferences have been

13 GEORGE V, A. 1923

held under the auspices of the Department of Agriculture at various periods since 1896 as the needs of the industry required.

Prior to the last conference official representation was practically confined to fruit growers, but in order that the industry should be fully represented, representation was extended to growers, shipping organizations, wholesale fruit dealers, barrel manufacturers, fruit box and fruit basket manufacturers, jam manufacturers, nurserymen and retail dealers, making an official representation of thirty-three. In addition to this there was an average attendance of not less than 150 who were sufficiently interested in the conference to pay their own expenses. These included representatives of the Provincial Government Departments, agricultural colleges, railway express and transportation companies and the fruit shippers' associations.

Various subjects of interest to the fruit industry, and those allied with it, were discussed, among which were fruit grading, standard fruit packages, fruit by-products, differentiation in grade names for fruit in boxes and barrels, grading for blueberries, standards for jams and jellies, fruit juice beverages and fruit and vegetable transportation.

The advisability of the formation of a horticultural council representative of the industry, and allied industries, in the broadest sense, was another of the most important subjects considered. It was the consensus of opinion that these industries could be greatly helped by the formation of such an organization. In order that the discussion might be facilitated, the Fruit Branch prepared a draft of a constitution and by-laws which, with a few amendments, were adopted, and subsequent to the conference, steps were immediately taken to place the organization on a firm footing. The enthusiasm manifested by all the interests represented, augurs well for the future of the organization.

The conference as a whole was pronounced by all to be the most successful ever held.

The amendments to the Act with respect to the sale of fruit which were adopted by resolution, are now in the course of preparation.

INSPECTION SERVICE

For inspection purposes the country is divided into five districts: (1) the Maritime Provinces, (2) Quebec and Eastern Ontario, (3) Western Ontario, (4) the Prairie Provinces and (5) British Columbia, with a district inspector in charge of each, these officers being in direct charge of the permanent and seasonal inspectors in their respective districts. The staff was practically the same as in the previous year except that in British Columbia, where the crop showed an increase of about 100 per cent over that of 1920, seven additional seasonal inspectors were appointed. It was thus possible to accede to the request of the berry growers on Vancouver Island and the lower mainland for a special inspection service which was necessary in view of the fact that the acreage, particularly strawberries, had more than doubled; in addition to work at the cold storage plants and shipping stations, the inspectors visited the growers in their berry patches and gave practical demonstrations in the proper methods of grading and packing for the various markets.

The inspection of basket, box and barrel factories was continued, with the result that the manufacturers in practically all cases put out packages in strict accordance with the legal standards.

An inspector was again stationed in the Lake St. John district, P.Q., during the blueberry shipping season and rendered excellent service to shippers and dealers.

In co-operation with the various Provincial Departments of Agriculture, meetings were arranged during the winter months when our inspectors were able to assist at packing demonstrations and by giving information with respect to packing, grading and marketing. The inspectors also assisted at various short courses in box packing,

SESSIONAL PAPER No. 16

and in many cases acted as judges at exhibitions. One officer of the Branch devotes all his time to giving instruction in barrel and box packing.

The inspectors in the district affected, co-operated with the Entomological Branch by being on the watch for violations of the European corn borer quarantine.

All violations of the Fruit Marks Act were carefully investigated by the chief inspector for the district in which the offender lived, and convictions were secured in forty-three cases, the greater number being for violations with respect to improper grading. Thirteen convictions were secured for over-facing fruit in open packages, and it is expected that the publicity given these convictions will have a marked effect on the packing next season. For the first time since the passing of the Act in 1901, a conviction was secured for obstructing an officer in the discharge of his duties, and another for changing the grade marks on apples after they had undergone inspection. Convictions were also secured for the shipping of packages not properly filled and the packing of fruit unfit for consumption.

An unusually large number of requests were received for special examinations, due in part to the increasing recognition of the value of our inspectors' reports, and also to the early maturing of the crop which caused the later varieties of all kinds of fruit to crowd the early shipments, and resulted in a tendency to repudiate contracts. The inspectors' impartial reports were found of particular value in securing satisfactory settlements.

The number of inspections made was considerably greater than in 1920, being 25,016 this year as compared with 16,786 last season. This was partly due to the increase in the staff but more particularly to the fact that the seasonal inspectors were appointed early enough to inspect the small fruits. The following table shows the number of lots of various kinds of fruit inspected and the number of packages inspected during the past season:—

Variety		Number of Lots inspected	Number of Packages in Lot inspected	Number of Packages inspected
Apples	.....Barrels	8,464	861,819	59,570
Apples	.....Boxes	5,995	2,233,524	88,907
Apples	.....Baskets	113	10,296	1,244
Pears	.....Packages	1,048	149,859	10,904
Peaches	....."	1,999	370,674	26,861
Plums	....."	1,274	304,877	13,977
Tomatoes.....	....."	1,306	241,950	20,893
Small fruits.....	....."	4,817	713,822	142,661

PUBLICATIONS BRANCH

The work of the Publications Branch comprises (1) the compilation and revision of mailing lists, (2) distribution of publications, (3) preparation and distribution of press articles, (4) duplicating, and (5) the publication of the *Agricultural Gazette of Canada*.

SYSTEM OF DISTRIBUTION

The restriction of the supply of publications has been followed by the abandonment of the principle of general distribution and the substitution of the direct request system in the sending out of the reports, bulletins and other publications of the department. There being no general distribution, even within the limits of the classes comprising the general mailing list, the maintenance of those classes and the work involved thereby was rendered futile. It was therefore decided, after consultation with the chiefs of the various branches of the department, to discontinue the classification of the general list by subject, and to classify only by provinces.

SESSIONAL PAPER No. 16

The relation of the articles distributed to the several branches of the department was as follows:—

Branches	Number of Articles
Experimental Farm.. .. .	192
Dairy and Cold Storage Branch.. .. .	58
Entomological Branch.. .. .	18
Live Stock Branch.. .. .	60
Seed Branch.. .. .	31
Fruit Branch.. .. .	28
Health of Animals Branch.. .. .	39
Publications Branch.. .. .	24
International Institute Branch.. .. .	9
Agricultural Instruction Branch.. .. .	10
Miscellaneous.. .. .	15
Total.. .. .	<hr/> 484 <hr/>

THE AGRICULTURAL GAZETTE

The aim of the "Agricultural Gazette of Canada" is to provide a source of information as to the policies and activities of the Dominion Department of Agriculture and of the Provincial Departments of Agriculture and of Education, in so far as the activities of the latter relate to agricultural education. By recording and keeping under review the progress of the work of the Dominion and the provinces, agricultural workers throughout Canada are kept informed as to developments, are assisted in their efforts, and a spirit of co-operation and unity is thereby promoted.

The Agricultural Gazette does not deal with what may be termed "applied agriculture," nor with recording the progress of strictly scientific research. The former is looked upon as belonging to the sphere of the agricultural press; the latter is dealt with elsewhere.

The Agricultural Gazette is sent free to agricultural workers and instructors, including school teachers who have the required agricultural teaching qualifications; to members of Parliament; to libraries; to the press, and, as an exchange, to institutions and individuals in other parts of the Empire and in foreign countries. There is also a small paid subscription list, but this is negligible.

The Agricultural Gazette is issued bi-monthly by the Publications Branch of the Department, the edition being 7,500 copies in English and 1,550 in French. The cost has been reduced by bi-monthly publication instead of monthly, as formerly, and this has been accomplished without materially lessening the value of the journal for the purpose for which it is intended. The criticism is sometimes heard that the Agricultural Gazette contains no "news" that has not already been published in some section or other of the agricultural press; that the agricultural press serves every purpose for which the Gazette is intended. These criticisms are based on apparent misapprehension as to the purpose of the Gazette and what it aims at accomplishing. The Gazette is not and cannot be a purveyor of news in the same sense as the daily and weekly press. It seeks to collect information as to agricultural developments in every province, so as to afford a comprehensive view of progress in the Dominion as a whole, and to record same for reference. No other publication undertakes to do this, and therefore the Gazette fills a sphere that no other regional publication fills, and does so without trespassing on the field covered by the agricultural press.

The Gazette attempts to give wider publicity to departmental effort on behalf of agriculture, particularly in so far as the Dominion Department is concerned, thereby enhancing, it is believed, the value of the work carried on.

REVISION OF MAILING LISTS

The day-to-day revision of the mailing lists is continuous throughout the year, and involves a large amount of detail. Besides the general list, certain special lists

are maintained, including those of the Seed, Live Stock, Dairy, Entomological, Fruit and International Institute Branches for the distribution of market reports, of circulars having to do with the regulatory laws administered by the department, and other matters.

A special revision of the general list was undertaken and practically completed during the year. The general list comprises 250,000 names, and will be retained in its entirety for the distribution of "Seasonable Hints," while the revision will constitute a sub-division of about 60,000, which will be available for special purposes.

DISTRIBUTION

During the year, seventy-five new publications were received, of which eight were reprints.

The following comparative statement shows the classes of publications and the number of copies distributed in 1920-21 and 1921-22.

	1920-21	1921-22
Reports.. . . .	15,719	15,249
Bulletins.. . . .	234,314	583,096
"Seasonable Hints"	712,911	976,709
Pamphlets.. . . .	117,629	58,851
Circulars.. . . .	168,155	608,070
Leaflets.. . . .	27,058	18,764
The Agricultural Gazette.. . . .	64,748	52,714
Total.. . . .	1,340,534	2,313,453

Announcements, mailing list application cards, etc., to the number of 1,122,083 were despatched, compared with 922,316 in the year previous.

Communications requesting publications numbered 80,799, while the number of publications sent in response thereto was 841,784, compared with 410,175 in 1920-21.

Careful attention is necessary in interpreting requirements, as well as in transmitting requests for additional information to other branches and departments.

The number of envelopes addressed from regular lists by automatic machinery was 1,684,611, while those addressed by hand in dealing with requests for publications approximated 120,250, making a total of 1,804,851.

DUPLICATING

Two multigraph machines were made use of in duplicating, and recently a mimeograph was added. The volume of work, much of which was for other branches, was as follows:—

Circulars, form letters, regulations, etc. (100) .. . . .(copies)	100,846
Press articles (166) " "	35,888
"News Letter," Entomological Branch (12) .. . . .(pages)	7,176
Total.. . . .	143,910

CHANGES EFFECTED

Although the branch has no supervision over printing, a revision of the system of numbering and classifying publications was instituted, and steps were taken to secure an improvement in the appearance of bulletins, pamphlets and circulars. The use of specially designed covers was recommended wherever the importance of the document warrants their employment.

The addressing of envelopes by typewriter instead of by hand was introduced; and form letters were made use of in dealing with requests wherever their employment was indicated.

A complete stock-taking of publications was effected, and a system of recording was introduced whereby the quantities on hand are immediately ascertainable.

SESSIONAL PAPER No. 16

THE AGRICULTURAL INSTRUCTION ACT BRANCH

The work conducted by the several provinces under the Agricultural Instruction Act during the year ending March 31, 1922, is summarized as follows:—

ONTARIO

From the grant of \$1,100,000 made annually by the Dominion for agricultural instruction, the province of Ontario received \$336,303 for the purposes contemplated in the annual agreement. Of this sum, \$104,000 was devoted to the agricultural college and to the agricultural school and farm at Kemptville, \$135,000 to the agricultural representative service, \$10,000 to vegetable growing demonstrations, and \$10,000 to elementary agricultural education. The balance was devoted to various purposes, such as soil and drainage demonstrations, the encouragement of co-operation and instruction in marketing, the women's institute extension work, short courses, demonstrations with vegetables, and hardy fruits in New Ontario, and in other ways, all tending to the advancement of agriculture and improvement in rural life.

Fifty agricultural representatives are employed who render service in all phases of agriculture, with special emphasis on work among the boys and girls and young men and women of the farms. In 1921, 442 school fairs were held in which 93,715 boys and girls participated. Agricultural classes were held to the number of 39, running for one month, with a total attendance of 1,138. These serve as a basis for junior farmers' organizations, and for the holding of competitions in the growing of farm crops and the rearing of swine and calves for profit, and the judging of live stock, the winners receiving a two weeks' short course at the Agricultural College.

The Kemptville Agricultural School is also an outcome of the classes held by the agricultural representatives, and is intended to serve the eastern portion of the province. The enrolment was first year 28; second year 16, and in the domestic science class for girls, 16, making a total of 60 students.

There were some 2,000 public and separate schools and 30 high schools in the province in 1921 with classes in agriculture. Three high schools maintained special agricultural departments. Practically all these schools conducted school plots. At the Normal Schools 1,330 teachers-in-training received agricultural instruction. In 1921, 524 teachers attended the summer courses in agriculture held at the Ontario Agricultural College and at two other points in the province.

QUEBEC

Quebec's share of the agricultural instruction grant amounts to \$271,113.76 annually. From the funds so derived practically every branch of agriculture in the province is aided and extended. To indicate the variety of purposes to which the money is put, it may be noted that during the year under review, \$75,000 was devoted to Macdonald College, the School of Agriculture at Ste. Anne de la Pocatiere and the Oka Agricultural Institute; \$35,000 to horticultural and entomological work, \$69,000 to agricultural representatives, who now number some 48, and \$20,000 to the promotion of agriculture and domestic science in schools and academies. The development of poultry husbandry was aided with a grant of \$18,000, animal husbandry with \$9,000, drainage demonstrations with \$9,000, seed selection and demonstrations with a like amount, and short courses and lectures with \$913.76. Other industries aided including dairying, bee-keeping, maple sugar and syrup producing. Lectures and demonstrations in agriculture were held to the number of 1,149 in 101 localities; attendance, 47,137. In house-keeping and agriculture for women, lectures and demonstrations to the number of 819 were conducted in 54 localities, with an attendance of 49,441 persons. The number of pupils conducting school or home gardens was 21,217, and the total number of school fairs held was 110.

13 GEORGE V, A. 1923

WESTERN PROVINCES

Out of the grant made to the different provinces under the Agricultural Instruction Act the three Prairie Provinces receive a total of \$227,807.21. Of this sum Manitoba received \$77,113.11, Saskatchewan \$81,728.48, and Alberta \$66,965.62.

Manitoba.—The principal features of the grant to the province of Manitoba were the allotment of \$19,000 to extension schools, of \$15,000 to aid in the teaching of home economics, and of \$16,000 for the encouragement and development of boys' and girls' clubs. Thus, nearly two-thirds of the grant was devoted directly to instruction in agriculture for the youth of both sexes. Eight thousand dollars went towards meeting the expenses of the agricultural representative system, and the balance of \$21,000 towards dairy work, poultry work, bee-keeping, cost of Killarney demonstration farm, and to soil analysis and survey.

The extent of the work in home economics is indicated by the fact that during the year 144 dress-making courses were held with a total enrolment of 2,186, and 79 millinery courses with an enrolment of 1,825.

Under an arrangement that exists between the provincial departments of agriculture and education and the Agricultural College, boys' and girls' clubs and school fairs are carried on co-operatively. In 1921, 225 central clubs and 1,600 branch clubs were organized, with a membership of 30,000. At the school fairs, held practically by all the clubs, school and club work is exhibited. Entries were made of 1,302 pigs, 1,167 calves, 392 sheep, 397 colts, 5,375 chickens, 14,784 specimens of cookery, grain 1,443, 22,355 of vegetables, 6,123 samples of canning, 2,497 of dairy products, 2,225 of weeds, insects 165, mechanics 2,285, specials 1,871, and school 54,014. In all there were about 130,196 exhibits from 30,237 exhibitors.

Last year 1,000 girls took part in demonstration team work. The live stock judging teams for boys were equally popular, and the 106 champions were given a trip to Winnipeg.

The short courses or extension schools for men were conducted as usual during the winter months, extending over a period of from one to two weeks.

Community institute meetings were held to the number of 380, at which 580 addresses were delivered, the total attendance being 36,000. Motion-pictures were effectively used in the work.

There are six agricultural representatives with a director in charge. Their duties relate to live stock improvement, boys' and girls' clubs, weed control, and similar matters, within their respective districts.

Saskatchewan.—The grant assists in equal amounts (1) the research and extension work of the College of Agriculture; (2) the special activities of the Department of Agriculture in connection with better farming trains, co-operation and marketing, animal husbandry, field husbandry, and dairying; and (3) school agriculture and related activities.

At the university seven members of the staff are paid from the funds, who are engaged in teaching and extension work, including the superintendent of homemakers' clubs and her assistants. These clubs since their organization ten years ago have linked up in a very effective way nearly 200 communities with the College of Agriculture.

Among the notable efforts of the year were the better farming trains, the inter-provincial weed special trains, and the campaign for better sires. The better farming trains visited 89 points and were attended by 37,000 persons.

The work under the supervision of the Department of Education includes teacher-training in household science and agriculture at the provincial normal schools, the holding of short courses in household science, the inspection of household science classes, boys' and girls' club work, and school fairs. During the year 64 clubs and 247 branches were organized and 3,865 members engaged in 6,217 pro-

SESSIONAL PAPER No. 16

jects. School exhibitions were held to the number of 285. The growth of these fairs has been rapid, namely, from 14 in 1914. Bulletins on household science and school agriculture were published.

Alberta.—In Alberta, more than fifty per cent of the year's grant, or \$40,000, was devoted to the maintenance of the six agricultural schools of the province; \$14,900 to agricultural representatives and their work, \$9,500 to women's work, and \$2,500 to the promotion of the poultry and egg-marketing service.

With reference to the schools of agriculture, the provincial agricultural department has taken particular care to equip and staff the schools in such a way that the best type of agricultural instruction may be given. The course of two years' duration gives special attention to field and animal husbandry, while farm mechanics, blacksmithing, and other useful and necessary work on prairie farms, are made prominent, as are dairying and poultry keeping, so as to make the course a comprehensive education in practical agriculture.

The extension work of the schools includes winter short courses attended by a number of short term students and by the farmers themselves.

British Columbia.—British Columbia participates in the grant to the extent of \$69,199 annually, and a wide field of work is covered. According to the year's agreement, \$10,000 was devoted to agricultural instruction in public, high, and normal schools and the training of teachers, and \$23,000 to the University of British Columbia College of Agriculture extension and investigation services; \$6,000 towards the cost of publications; 9,000 to the bee-keeping industry, including demonstration apiaries; \$6,000 to pathological and entomological investigations; \$9,000 to dairying and cow testing, and lesser amounts to dry farming and field crop demonstrations, to seed work, silo demonstrations, horticultural demonstrations, fruit packing and pruning schools, poultry keeping, and for the encouragement of boys' and girls' clubs.

In connection with the grant allotted to school agriculture, a feature has been the appointment of district supervisors of agricultural instruction, who are called upon to conduct a two year course of study in agriculture for high school students, as well as extension work and continuation classes in agriculture during the winter months for those who are no longer attending school.

The policy of the College of Agriculture has been, first, to accumulate data on which to base conclusions, and then by means of bulletins and extension schools to carry these conclusions to the farming community. All work under the Act is organized by projects. These include fertilizer experiments; experiments with clover and grass mixtures; weed survey; cost of milk production; experiments to determine the period of usability of milk; horticultural survey, and poultry survey. Extension schools of four days' duration were held at four points during the year, the total registration being 732.

With regard to the work of the provincial Department of Agriculture, much attention has been given to dairying, poultry and bee-keeping, silo construction, and to horticulture generally. Work in horticulture includes personal visits to fruit growers for the giving of counsel, holding orchard demonstrations, lectures, assisting in judging at fairs, and directing experiments for the control of injurious insects and plant diseases.

MARITIME PROVINCES

While the detailed application of the money in each province is not exactly the same, the purposes to which it has been put are very similar. The Agricultural Representative system has been aided and extended. Short courses have been established and maintained. Demonstrations and lectures have been given in dairying, live stock breeding and rearing, poultry keeping, bee keeping, silo preparation, and use of fertilizers, improvement of field crops, the care of orchards and fruit-growing,

and in entomological work. Woman's work has been advanced and women's institutes greatly aided. Boys' and girls' clubs and school fairs have been encouraged and their numbers increased. In short, impetus has been given to every existing line of agricultural instruction and education and in many instances to the originating of lines of development not recognized prior to the passing of the Act in 1913.

Nova Scotia.—Nova Scotia received as its quota of the grant the sum of \$81,716.69. Of this amount, \$23,000 was allotted to staff salaries at the Agricultural College and in extending working facilities. To provide interest and sinking fund on building account \$8,000 was allotted. The expenditure on agricultural representatives was \$12,000; on entomological work, \$7,500; on women's work, \$5,000; on dairying \$6,000, and \$7,700 was distributed among minor activities such as poultry and bee-keeping, field crops, soil and fertilizer demonstrations, and horticulture.

Two agricultural representatives were permanently employed and six for part-time. Short courses were conducted at four local points as well as at the college itself.

The allotment to elementary agricultural education was \$12,000. In this division of work are included teacher-training, school clubs, school exhibitions, and school and home gardens. About 5,000 children each year make home gardens under school supervision. School fairs to the number of 220 were held representing 450 schools.

New Brunswick.—From the annual grant of \$64,110.80, to the province of New Brunswick, \$12,000 was allotted to agricultural representatives, \$7,700 to women's institutes, \$6,500 to soils and drainage, \$4,900 to horticulture, \$12,000 to elementary agricultural education and the balance was divided between live stock, dairying, poultry, entomology, agricultural societies, bee-keeping, horticulture, and short courses, in amounts ranging from \$3,000 to \$4,000 in most cases.

Two agricultural representatives were maintained, who specialized in such practical activities as sheep dipping, docking, etc., poultry culling, potato spraying, and field crop competitions.

Nine branch women's institutes were established during the year, and demonstration lecture courses were carried on both in summer and winter.

The work on soils and crops included demonstration plot work with the use of pulverized limestone, clover hulling was demonstrated and drainage surveys were made.

Under horticulture, assistance in orchard work was given in a number of instances.

Dairying received assistance through the system of factory and creamery inspection and the holding of dairy short courses.

To qualify teachers for instruction in agriculture, the usual courses were provided at the summer schools of science. Gardening and poultry rearing as home projects were given supervision, the produce being exhibited at the school fair.

Prince Edward Island.—Of the \$31,749.22 received under the Act, \$4,300 provided for a director and an agricultural representative, \$4,700 for drainage, soils and crops, \$3,000 for dairying and live stock, \$3,200 for Women's Institutes, and \$12,100 for elementary agricultural education, which includes a contribution of \$8,000 towards the cost of maintaining the Technical and Agricultural School at Charlottetown. The work under the various headings is similar to that carried on in New Brunswick and Nova Scotia.

SESSIONAL PAPER No. 10

THE INTERNATIONAL INSTITUTE BRANCH

The Canadian office as usual furnished the Institute with a great deal of information concerning agriculture in Canada, part of this information being in connection with the 1922 General Assembly. Statistical data on production, imports, exports and prices of agricultural products were supplied for the 1919-21 issue of the *International Yearbook of Agricultural Statistics*. Among the other information sent to the Institute were a comprehensive statement on its organization of agricultural statistics in Canada, a memorandum on forestry and forestry statistics in Canada, an article giving a detailed description of the legislation in the various provinces of Canada under which organized facilities have been furnished to farmers, a memorandum on material and social conditions among the rural population of the different provinces, further data on agricultural book-keeping in Canada, etc.

The three bulletins of the Institute, the "*International Review of the Science and Practice of Agriculture*," the "*International Review of Agricultural Economics*," and the "*International Crop Report and Agricultural Statistics*" were received and distributed to selected lists of officials and agronomists throughout Canada.

Summaries are prepared by the branch, from the 300 pages approximately which the three bulletins contain, and published in an allotment of from 20 to 25 pages of space in part V. of the "*Agricultural Gazette of Canada*." Only the titles and sources of information are given for a great number of articles of interest which, for lack of space, cannot be published even summarily. This is done generally for the whole Bulletin of Agricultural Economics. Any persons desiring it are invited to secure from the branch fuller details in the original Institute bulletins which, upon application, are furnished free of charge. Furthermore, the complete unsummarized articles, contained in the original documents which the Institute reviews, are in most cases available for loan in the library of the branch.

Mr. Louis Dop, delegate for France and Vice-President of the Institute, in a recent report sums up his appreciation of the three bulletins as follows:—

"If we examine the question fundamentally, the very creation of the International Institute constitutes the most self-evident example of the possibility and the attractiveness of international co-operation in questions of agricultural documentation. In fact, what has been the essential purpose of the creators of the Institute? It is to place at the disposal of the governments, administrations, scientific bodies, men of science and practice, under a synthetic and summary form, the whole body of the whole world's agricultural publications, as well as a summary of the progressive advances of all kinds, whether from the scientific or the practical viewpoint which each of these publications may contain.

"Article 9 of the Convention of 1905 undoubtedly shows that such has been in fact the purpose which the adhering states had in view when they stated: "The Institute, always confining its attention to the international aspect of the various questions concerned, shall: (a) collect, study and publish as promptly as possible statistical, technical, or economic information concerning farming, vegetable and animal products, trade in agricultural produce, and the prices prevailing in the various markets; (b) communicate the above information as soon as possible to those interested.

"It is self-evident that the governments derive the most substantial benefits from the participation through the Institute in the work of collection, elaboration and summarizing which is realized by means of the technical services of the Institute and which is brought to their knowledge by means of the bulletins.

"There is no doubt that if the States, each acting for itself alone, should collect, study, elaborate and summarize all the international literature which, at

13 GEORGE V, A. 1923

the present moment, forms the basis of the various international publications, the result would be that each Government would incur considerable expenditure and the necessity of creating a staff specialized in the summarizing work.

"By creating the Institute and paying it their annual contribution, the States were advisably relieving themselves of this work and thus realizing an economy in the services of a personnel and in materials. The co-operation of the States in the whole body of work carried on by the Institute consists in the direct information which is sent regularly and periodically to the Institute whether relating to statistical questions or any other information which the different Institute Bureaus solicit from each national administration. Such are the principles and such are the facts confirmed by a series of years of cordial and confident collaboration between the adhering States and the Institute."

The tenth volume of the "International Yearbook of Agricultural Legislation" was published. It contains the legislation on agriculture enacted by the different countries during the year 1920. In the intervals between the issues of this yearbook, all agricultural laws of importance are printed and distributed without delay to the adhering countries in a separate pamphlet for each law. These laws are translated by the branch and communicated to anybody desiring them.

The "International Yearbook of Agricultural Statistics" which covers the ten years 1912-1921, particularly the last three years, is ready for distribution and will be distributed very shortly.

The yearly pamphlets dealing with the production, trade and prices of feeding stuffs and chemical fertilizers were issued. Three important monographs were published on international trade in live stock and animal products, the collection and use of residues and waste products, and oleaginous products and vegetable oils.

Memoranda were prepared in answer to requests for information on subjects relating to agriculture, including co-operation, rural credits, agricultural research, electricity on the farm, marketing, cost of production, etc.

The Statistical Bulletin of the Institute was increased in interest and value by the inclusion of reports from several of the new countries of Europe which have organized statistical services, and for the first time since the war practically all the European countries are furnishing statistics of production, imports and exports of the principal cereals. The "Bulletin of Statistics" is now issued in three separate sections, one for prices, published about the 5th of the month; another for production, about the 20th, and a third for trade and stocks, about the 27th, so as to ensure more prompt and satisfactory publication in the case of each section.

Subsequent to the recommendations made at the instance of Canada at the General Assembly of 1920, the English edition of this Bulletin was greatly improved through substituting the weights, measures and currency of English speaking countries for the metrical system. Acres, centals of 100 pounds, and dollars and cents replace hectares, quintals and francs. Besides, the substitution of bushels for centals, which was also urged by this branch, is practically promised by the Institute, so that shortly the Canadian producer will find the data which interest him concerning prices, production and stocks reduced to the units and measures and currency which he can easily understand.

Cabled crop reports were received monthly from the Institute and at once given, with explanatory comparative data, to the newspapers through the "Canadian Press Limited." A large number of correspondents were furnished with statistical information on the world's crops and live stock, trade in agricultural products and prices.

The publication in the "Agricultural Gazette of Canada" of the series of agricultural articles on the world's cereal situation was continued. An article on the world's live stock with tables giving the numbers of cattle, sheep and swine in the different countries was published.

SESSIONAL PAPER No. 16

The Institute is constantly improving its international crop reporting system. At present regular monthly information is received from Canada, United States, India, Japan, Algeria, Egypt, Tunis, Great Britain and Ireland, France, Italy, Bulgaria, Czecho-Slovakia, Hungary and Germany.

Arrangements will soon be made with Spain for a monthly service. Estimates of acreage and production are supplied early. It is expected that Poland will soon furnish regular reports, as a statistical service is already established in that country. Strong efforts are being made to obtain complete reports from Roumania and Jugo-Slavia.

The large producing countries of the Southern Hemisphere are the object of special interest to the Institute. Fairly regular reports are being received from Australia and Argentina, and every effort is being made to obtain more complete and rapid returns from these countries.

As regards the *rapidity* of issuing of crop reports great improvement has been effected during the past year. Most European countries had their statistical services disorganized during the war, but a quick return to efficiency in respect to the publication of earlier forecasts or estimates of harvest yield is shown in the following table:—

COMPARATIVE DATES OF PUBLICATION OF FIGURES CONCERNING
WHEAT YIELDS

Countries	1921	1920
Belgium.....	June 25.....	August 21
Bulgaria.....	June 25.....	September 18
Greece.....	June 25.....	August 21
Algeria.....	June 25.....	July 17
Tunis.....	June 25.....	July 17
Spain.....	July 23.....	August 21
Finland.....	July 23.....	August 21
Alsace Lorraine.....	July 23.....	August 21
Italy.....	July 23.....	August 21
Hungary.....	July 23.....	August 21
Japan.....	July 23.....	October 23
Netherlands.....	August 20.....	October 23
France.....	September 10...	October 23
Poland.....	September 17...	October 23
Roumania (incomplete).....	September 24...	December 18
Czecho-Slovakia (incomplete).....	September 24...	October 23
Germany.....	October 10.....	December 10
Canada.....	August 10.....	August 14

The dates referring to Canada are those on which the data were received and forwarded from this Branch by cable. There was considerable delay between such despatch and the reception of the cables by the Institute, which the Cable Company promises to remedy for the future. These delays occurred for each monthly despatch throughout the growing season and varied between two and four days, the latter delay for one despatch only. There was also some delay, although not so great, in the transmission of data from the Institute to this Branch.

LIBRARY OF THE INTERNATIONAL INSTITUTE OF AGRICULTURE AT ROME

This library on June 30, 1921, comprised 42,010 volumes and 32,044 pamphlets, altogether 74,342 publications. On the same date the number of periodicals received was 3,004, of which the free exchanges number 1,911. The International Institute proposes to publish very shortly a general catalogue of its library. This has already been prepared to the end of 1917, and is now to be extended to the close of 1921. It

also proposes to resume the monthly Bibliographic Bulletin, publication of which was suspended at the close of 1916, and to insert approximately 5,000 titles per issue, a number which will considerably exceed that of any other catalogue of the kind published by any one of the adhering countries. It is hoped through these two publications to secure the universal adoption of the decimal system of classification and collaboration between the corresponding national institutions and the Institute. The importance of these proposals in the interest of world-wide agricultural bibliography, as well as the co-ordination of agricultural information generally, cannot be overestimated.

LIBRARY OF THE OTTAWA INSTITUTE BRANCH

	1921-22	1920-21
Bound volumes received (from binding, gifts and purchase).....	1,393	1,345
Total volumes in library.....	10,371	
Periodicals (pieces) received.....	12,717	12,561
Pamphlets received.....	10,483	10,692
L.C. cards received.....	6,190	8,346
Number of cards in catalogue (approximately).....	225,000	
Number of borrowers.....	662	415
Number of publications borrowed.....	4,818	2,754

ANALYSIS OF BORROWERS

	Borrowers		Books borrowed	
	1921	1922	1921	1922
Department of Agriculture (Ottawa).....	80	101	752	1,093
Ottawa, exclusive of Department of Agriculture.....	115	139	1,009	1,266
Ontario, exclusive of Ottawa.....	67	92	330	587
Quebec.....	50	104	222	527
British Columbia.....	29	45	111	273
Alberta.....	16	27	65	197
Saskatchewan.....	16	46	121	243
Manitoba.....	17	47	58	281
New Brunswick.....	9	24	32	133
Nova Scotia.....	7	19	24	112
Prince Edward Island.....	6	12	21	64
United States.....	3	5	9	40
Belgium.....	0	1	0	2

A number of important bibliographies were prepared and an increasingly large number of correspondents and visitors to the library were aided in their reference and research work.

Respectfully submitted,

W. R. MOTHERWELL,
Minister of Agriculture.

SESSIONAL PAPER No. 16

APPENDIX No. 1

Canada
No. 491.
26th August.

DOWNING STREET, 9 September, 1921.

My LORD,—With reference to my despatch No. 207 of the 25th April, I have the honour to transmit to Your Excellency for the information of your Ministers, copy of a Note from the Danish Minister enclosing copies of a report on the proceedings of the International Seed Control Congress, held at Copenhagen in June last.

I have the honour to be,

My Lord,

Your Lordship's most obedient
humble servant,

(sgd) WINSTON S. CHURCHILL.

Referred to Agriculture.

GOVERNOR GENERAL

HIS EXCELLENCY GENERAL

THE RIGHT HONOURABLE

LORD BYNG OF VIMY, G.C.B., G.C.M.G., M.V.O., etc., etc., etc.

The Danish Minister presents his compliments to the Secretary of State for Foreign Affairs and referring to the Marquess Curzon of Kedleston's note No. N. 5797/2812/15 of May 24th last regarding the International Seed Control Congress has the honour herewith to enclose four copies of a brief report concerning proceedings of the said conference which took place in Copenhagen from the 6th to the 11th of June last.

M. de Grevenkop Castenskiold would be grateful if Marquess Curzon would be good enough to transmit a copy of the above mentioned report to the Governments of New Zealand, Canada, Australia and the Union of South Africa.

London, 26th August, 1921.

The International Seed Testing Congress which took place in Copenhagen from the 6th to 11th of June 1921 proceeded from the beginning to the end in the most excellent way and the best feeling was noted among all the Delegates.

Thirty delegates were present, representing the following 17 countries: Belgium, Canada, Czecho-Slovakia, Denmark, Finland, France, Holland, Italy, Jugoslavia, Norway, Poland, Roumania, Switzerland, Great Britain, Sweden, Germany and Hungaria. The Danish delegates, Professor Dr. W. Johannsen, chairman of the State Seed Testing Board, and Mr. K. Dorph Petersen, director of the State Seed Testing Station, were unanimously elected Presidents of the Congress as a result of the proposition, made to that effect by Sir Lawrence Weaver, Director General of the English Department of Agriculture, and Mr. Insulander, Director General of the Swedish Department of Agriculture.

The detailed and competent discussions on the various subjects were followed with keen interest. Sir Lawrence Weaver proposed to form an association of all Seed Testing Institutions in Europe at the head of which there should be a committee to start the co-operative work, agreed upon, by the Congress. This resolution was carried unanimously by the representatives of the above mentioned countries. The respective Directors of the State Seed Testing Stations in Denmark (K. Dorph Petersen), Holland (F. F. Bruijnung) and Switzerland (A. Volkart) were elected members of the said Committee. The Swiss member was elected also in

13 GEORGE V, A. 1923

view of having carried out and conducted comparative investigations regarding places of origin of Redclover and lucerne-seed. A Committee was formed, consisting of Hofrat V. Degen, Budapest, Professor Voigt, Hamburg, Professor Bussard, Paris and the Director Vitek, Prague and Enesco, Bucharest, to initiate a thorough investigation concerning the occurrence of seed of the parasitical plant Silk (*Cuscuta* sp.) and the method to fight it.

In addition to the ordinary meetings the Delegates and some few guests were assembled to an official dinner, given by His Excellency the Minister of Agriculture who was present in person. A number of speakers emphasized the opportunity of the congress and its great success. In addition to the ordinary meetings which took place in Copenhagen, an excursion was made to the control fields of the State Seed Testing Station, the State Experiment Station, the Museum of Agriculture and the ancient farm steads at Lyngby and finally to the State Experiment Station at Tystofte, where the leader of the Experiments, Mr. Linhard demonstrated the plant-breeding work.

An invitation, made by Sir Lawrence Weaver, on behalf of the British Government, to hold the next Seed Testing Congress in England in 1924, was unanimously agreed upon by the Congress.

At the close of the Congress Professor Voigt, Sir Lawrence Weaver and Mr. Insulander expressed their thanks in a most hearty way, for the interesting, instructive and pleasant days of the Congress.

Everybody recognized the importance of a thorough education and practice in the analysis of seeds and found it desirable that the leaders among the staff might have an opportunity to work a short time at the main seed testing stations abroad.

One of the department chiefs and one of the assistants of the State Seed Testing Station in London have, in June, been working at the State Seed Testing Station at Copenhagen in order to acquaint themselves with the method in vogue in Denmark in regard to purity-test of grass-seed, as the said method is intended to be introduced into Great Britain from August this year.

(Sgd.) K. DORPH PETERSEN,

*Director of the State Seed Testing
Station at Copenhagen.*